ACQ-201

Intermediate Systems Acquisition Course (ISAC)

STUDENT GUIDE INTRODUCTION

Defense Systems Management College

Dear Student:

Welcome to ACQ-201, the Intermediate Systems Acquisition Course (ISAC)! You are about to begin a course that is fundamentally different from almost any other government training you have ever attended. DoD courses often attempt to provide career specific insight. This course, however, seeks to broaden your knowledge across the functional disciplines. We have specifically designed this course so you learn about the policies, practices and issues important to the people you work with in the pursuit of delivering weapons systems to the warfighter. They may be Command/ Control/ Communication/ Computer-Surveillance and Reconnaissance (C4ISR) systems, Automated Information Systems, or Weapon Systems. They all draw upon the same set of disciplines to achieve success. Integrated Product Teams and the Integrated Product and Process Development concept has become the standard approach of the DoD in acquiring our systems. You will hear much more about this as you begin your ACQ-201 journey.

The acquisition of our systems is undergoing a revolutionary change. The Acquisition Reform initiatives instituted over the past few years have fundamentally changed what we do, and fundamentally changed what is expected of you, the acquisition workforce member. The revision of the DOD 5000 series affords us greater opportunity to do what makes good technical and business sense. This "freedom", however, comes at a price. YOU are now expected to have a greater insight into the "why" of our business, and to rely less on the "cookie-cutter" approach of old. This course will provide you this broad cross-functional insight.

ACQ-201 will expose you to the policies, practices and issues inherent in all of the functional disciplines required to acquire successful systems. This student guide provides you an overview of each of these areas. This three-week course is divided up into three Blocks -Policy, Technical, and Business; each in a Volume of Student Material. There is also an Integrated Exercise, Volume IV. The challenge is to stay focused on how these functional areas apply to your particular situation. Your fellow students come from a diverse population; multiple services, career paths, grades, ranks, and years of experience. We challenge you to learn from them. Their insights can be, at times, as valuable as the formal instruction. Look for the diversity in approach. Listen to how different types of systems used innovative approaches to solve complex problems. You and your fellow students represent a world of experience. Get to know them. Share your experiences with them. If we can be of help in furthering your acquisition expertise in a particular area, please let us know. We want you to enjoy the course, to get a lot out of it and to grow in your pursuit of systems acquisition management excellence.

Dr. John Hamel
Course Director

DEPARTMENT OF DEFENSE

DEFENSE SYSTEMS MANAGEMENT COLLEGE
9820 BELVOIR ROAD
FORT BELVOIR, VA 22060-5565

March 6, 2000

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Policy on Grading for ACQ 201 (Intermediate Systems Acquisition Course)

1. This memorandum implements DAU Policy Memo No. 11 for the ACQ 201 (Intermediate Systems Acquisition Course (ISAC)). Students must achieve a minimum average grade of 80% to graduate from ISAC.

2. The three ISAC tests will be open book, and will be averaged to satisfy the 80% standard. Students, must achieve an 80% average to be awarded a diploma.

3. Active participation in classroom discussions and lesson exercises, as well as the final integrated exercise, are vital parts of the student's learning experience. These aspects of the learning experience are not objectively assessed, but should be accounted for in the determination of the student's final status. Therefore, the on-site Course Director will subjectively evaluate each student's participation in classroom discussions, exercises, and the final integrated exercise. The Course Director may deduct or add quality points of up to 5% of the final student grade (i.e, no more than 5 points), for this subjective evaluation. For example, a student who achieves a satisfactory grade on the three objective tests (80% or better), but does not participate in classroom discussions, lesson exercises, or the integrated exercise should have quality points deducted. Similarly, a student making outstanding contributions in these same areas may have quality points added to the final grade.

4. A student achieving less than 40% on the first test, or 70% average on the first two tests cannot mathematically achieve the 80% average score on the objective tests. Therefore, the Course Director is to initiate action to dismiss the student as soon as the early dismissal condition is evident, consistent with the student's status relative to the quality points discussed in paragraph 3, above.

5. After contacting the appropriate Dean (offering school), and discussing the situation with the student's supervisor, a decision will be made as to immediate dismissal, or retention in a non-graduate status.

J. T. SHANNON
Dean of Faculty

DEPARTMENT OF DEFENSE

DEFENSE SYSTEMS MANAGEMENT COLLEGE
OFFICE OF THE COMMANDANT
9820 BELVOIR ROAD
FORT BELVOIR, VIRGINIA 22060-5565

DCAS-HR

MEMORANDUM FOR ALL DSMC STAFF, FACULTY, AND STUDENTS

SUBJECT: Nonattribution Policy

1. The Defense Systems Management College (DSMC) encourages and expects full and candid discussions during class instruction, on field trips, and in dialogue with guest speakers. Achievement of this level of openness requires that when personal views of a sensitive nature are presented, such as support or criticism of any aspect of the Defense Department, they will not be repeated to the possible embarrassment of the person presenting them. Each individual is responsible for treating sensitive points or privileged information with discretion; each individual will refrain from repeating the content or connecting the speaker with the views expressed outside the group to whom the speaker entrusted this information. Videotapes of DSMC presentations are to be used only for DSMC instructional purposes unless specific written permission for other use is obtained from all participants.

2. This policy also applies to discussion periods at DSMC and on field trips. Specific statements or remarks should not be attributed to specific speakers. Our objective is to enable students, instructors and guest speakers to express their views freely and without concern for possible attribution or embarrassment. On rare occasions, it may be necessary under the law to make material available to authorized government agencies. I reserve approval for release under these conditions.

Frank J. Anderson Jr.

FRANK J. ANDERSON, JR.
Brigadier General, USAF
Commandant

ADMINISTRATIVE INFORMATION

EVALUATION PROCEDURES

Students will be evaluated in two areas. First, students will be assessed on their achievement of the Terminal and Enabling Learning Outcomes identified in the Lesson Assignment Sheets for each of the lessons. There will be three objective exams, one for each block of instruction: Policy, Technical and Business. Students must achieve an average score of 80% or better on these exams. Each exam will cover only that block of instruction (i.e., non - comprehensive). Second, each student is expected to actively participate in all of the student exercises conducted throughout the course, including the Integrated Exercise, ending with an outbriefing. The course director will counsel any student who fails to meet either of these standards. This counseling session will result in (1) a determination of any necessary corrective action, or (2) a recommendation that the student be dropped from the course. Failure to satisfactorily complete corrective actions will result in an unsatisfactory grade for the course. The Commandant/Commander of the offering school will make the final decision on dropping a student from the course.

ATTENDANCE

DSMC's goal is full-time attendance in this course. Students are asked to clear their work schedule prior to arrival at DSMC. The rigorous daily schedules do not permit time for meetings, appointments, or extensive telephone calls during the class day. The course director must approve all absences from class, in advance if possible. Missing more than 4 hours of scheduled lesson time may be grounds for dismissal from the course. Missed class time must be made up before the student can receive a diploma and DAU recognition/certification. The make-up will be determined by the course director. It may include: (1) attending missed portions of the course at a later offering; (2) participating in make up sessions after normal class time; or (3) other make-up activity such as a tailored project or paper. Airline reservations are not a valid excuse to arrive late on the first day or to depart early on any day of class.

NON ATTRIBUTTON

DSMC encourages and expects full and candid discussion during class instruction. Achievement of this level of openness requires that when personal views of a sensitive nature are presented, they will not be repeated to the embarrassment of the person presenting them. Each individual is responsible for treating sensitive points or privileged information with discretion. Students must refrain from repeating the content or connecting the speaker with the views expressed outside the group to whom the speaker entrusted this information.

COURSE SCHEDULE

The schedule for your individual offering may vary slightly due to holidays and other factors. Your course director will give you a detailed course schedule at the beginning of your course. You should refer to that schedule for planning your lesson preparation.

FUNCTIONAL AREA DESCRIPTIONS

The goal in **ACQ-201** is the integration of the various functional disciplines to better prepare the student to conduct Integrated Product and Process Development (IPPD) and to serve as a member or leader of an Integrated Product Team (IPT). To that end. we provide significant instruction in each of the functional areas so our students will have a balanced perspective on the
critical definitions, policies, processes, and issues in each area. Below is a brief description of each of these functional areas.

The **Acquisition Policy (AP)** functional area covers the decision-making process that involves three key defense acquisition participants: the Department of Defense, Congress and industry. AP material includes organization and management practices in the DOD, the life cycle and resource allocation management models, and the basics of acquisition strategy and planning. A clear understanding of the policies that enable and constrain acquisition management will allow the tailored application of these policies to suit individual programs. AP provides an understanding of the systems life cycle management structure as well as the environment and policies that influence that structure.

The **Contractor Financial Management** (CF) area addresses contractor financial issues that affect the day-to-day contractor motivation and working relationship between government and industry. Lessons discuss key financial concepts. CF also introduces the student to cost accounting principles needed for government contracting.

The **Contract Management** (CM) lessons provide an understanding of the systems acquisition contracting process. It places emphasis on areas where acquisition management personnel interact with contracting personnel. CM covers types of contracts, solicitation considerations, source selection, negotiation, and contract administration.

The **Earned Value** (EV) functional area focuses on application of Earned Value Management Systems Criteria (EVMSC) and their use in evaluating contractors' management control systems. This area also covers financial reporting to the Government including the Cost Performance Report (CPR) and Cost/Schedule Status Report (CSSR). Lessons address various methods of analyzing performance data, developing programmatic questions based upon these data, and techniques used in generating estimated cost-at-completion for acquisition contracts.

The **Funds Management** (FM) functional area introduces methods an acquisition manager uses to estimate, obtain, retain and use the financial resources necessary to successfully execute a systems acquisition program. This functional area addresses how to estimate the resources needed for an acquisition program, and how to manage the program and budget through the Planning, Programming, and Budgeting System (PPBS). It explains how the Congressional authorization, appropriation, and budget enactment processes work. Finally, FM covers how to effectively protect. reprogram, commit, obligate, expend, and account for budget authority apportioned to a program.

The **Acquisition Logistics** (LM) functional area identifies systems supportability issues as part of the systems engineering process. It addresses Logistics Support that focuses on how supportability objectives influence system design and life-cycle costs. It also covers reliability, availability and maintainability (RAM) and their relationship to system design.

The **Program Management and Leadership** (PM) functional area addresses government and industry program managers' responsibilities. It covers the general principles of risk management and program planning and control with the goal of achieving balance in the complex and dynamic defense acquisition environment. The lessons also provide the student with knowledge and skills to improve individual managerial competencies. This will enhance the student's effectiveness as a member of an Integrated Product Team. PM covers how human skills contribute to organizational excellence in acquisition management by focusing on team building and tools for decision making.

The **Manufacturing Management** (MM) functional area covers concepts and tools needed to plan for and deliver high quality products within the context of the Systems Engineering process. Major topics covered include: planning for production, influencing the design process. transitioning from development to production, and execution of the production plan.

The **Systems Engineering** (SE) functional area addresses the common process of converting a requirement into a finished, quality product. The description of the Systems Engineering process serves as the foundation to integrate all the technical disciplines required to develop and produce an effective, balanced, affordable, and supportable system.

The **Software Management** (SM) functional area lessons teach principles for the development of critical software for today's modem systems. The objective of SM is to instill in the students a sense of the magnitude and impact of computer resources. It will expose them to current software terminology, the software development cycle, current policies and standards, and several helpful management techniques for managing software development and post-production support.

The **Test and Evaluation** (TE) functional area addresses test and evaluation as an integral part of the systems engineering process in the acquisition life cycle. Discussion covers policy and management structures within DOD, types of testing activities and how they relate to the acquisition phases, test resources, and the Test and Evaluation Master Plan (TEMP).

STUDENT LESSON PREPARATION INSTRUCTIONS

Introduction

ACQ-201 is an intermediate level course. It relies on your understanding of information introduced in the course's prerequisite, ACQ-101, Fundamentals of Systems Acquisition Management (FSAM). Other methods of meeting this prerequisite are possible. If it has been a significant amount of time since you took ACQ-101, or if you have met the prerequisite in some other way, for example, fulfillment, please let your course director know as soon as possible. The course director can assist you in identifying sources of information that may help your preparation for class.

Each block of instruction will be introduced with a student Lesson Assignment Sheet (LAS). Each LAS will include lesson title, duration of the lesson, an overview, and terminal and enabling learning objectives. Terminal learning objectives, or TLOs, will describe the overall learning outcome required for a given lesson. Enabling learning objectives, or ELOs, will breakdown the lesson into blocks that support the TLO. In addition, most lessons will require outside preparation (i.e. homework); an estimated student preparation time (ESPT) is provided to help you gauge the amount of time required to study a particular lesson. The LAS for each lesson identifies the type of preparation required using the definitions below:

Definitions

READ: Material which may not be covered in class but which may form the basis for new material. The student should read this material if it appears to be unfamiliar.

STUDY: Required material which must be studied by the student in order to be prepared to participate in classroom discussions and activities. Some or all of this material may not be covered in class, but the student will be held accountable for its content.

PREPARE: Case studies, critical incidents, briefings, issue papers, or other activities which must be completed prior to class. Time will NOT be allocated for preparing this material during class.

SCAN: Additional material which may form the basis for part of what will be covered in class. The student is encouraged to scan this material for a better understanding of the subject area and to be better prepared to participate in class discussion/activity.

LESSON ASSIGNMENT SHEET

Lesson Number AP 01

Lesson Title Overview Of Defense Acquisition Management

Lesson Time 2

Lesson Overview This lesson addresses the DoD acquisition environment, major players, governing directives, acquisition reform initiatives, and characteristics of a successful program.

Terminal Learning Objective Given choices, the student should be able to compare and contrast, in the changing DoD environment, the impacts of major institutional players, acquisition reform initiatives and policies on defense systems acquisition management.

Enabling Learning Objectives

- 1. Identify key world, national and DoD environmental changes (e.g., policy, technology, political) and their impact on the acquisition community.
- 2. Identify the varied responsibilities and perspectives of the DoD organizations and other major players participating in acquisition management.
- 3. Recognize how the major players interact with each other and the Program Management Office.
- 4. Identify the key elements, themes and policies of DoDD 5000.1, DoD 5000.2-R and the Defense Acquisition Deskbook.
- 5. Identify key elements and drivers of acquisition reform.
- 6. List the characteristics of a "successful" defense acquisition program from a variety of perspectives

Assignments

- STUDY: DoD 5000.1
- SCAN: DoD 5000.2-R, Part 3

ESPT 1

Assessment	Objective test
Related Lessons	• N/A
Self Study References	• None

AP 01 OVERVIEW

First Hour:

- Impact of World Events on Systems Acquisition
- Major Players

Second Hour:

- Policy Guidance
- Downsizing and Acquisition Reform
- Goals for a Successful Program

AP01, VG - 1

Changing Threats to U. S. National Security

1988	Today
Central European Conflict • Soviet dominated Warsaw Pact	

Other Threats

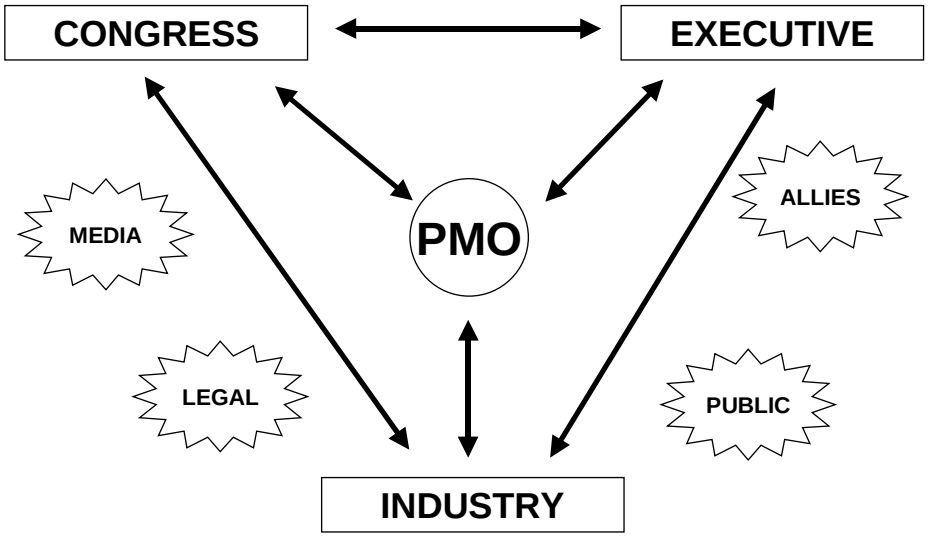
AP01, VG - 2

Changes In the Security Environment Lead to Changes In Systems Acquisition

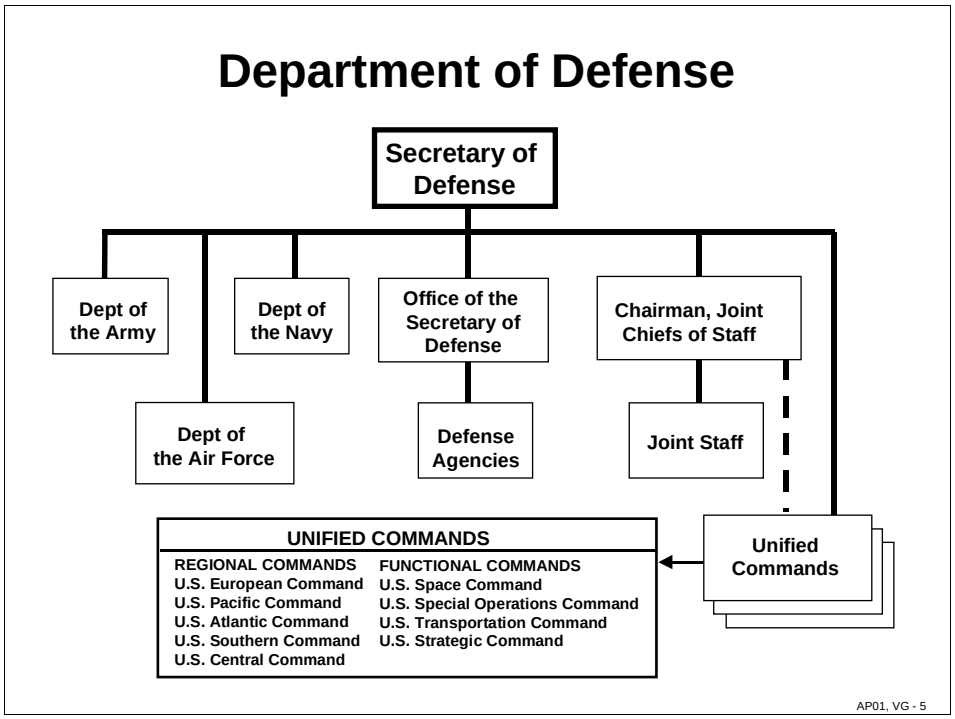
Past		Today
Many new systems	→	
Focus on nuclear warfare	→	
Technology driven	→	
Service specific programs	→	
Military unique technology	→	
Technology development	→	

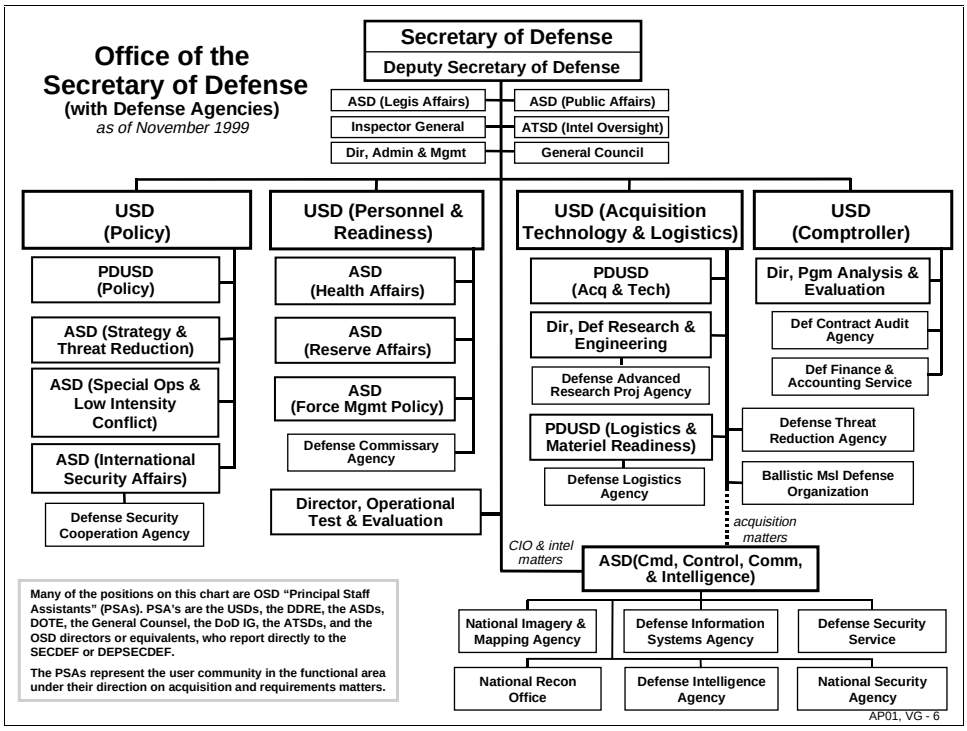
AP01, VG - 3

THE PMO's ENVIRONMENT



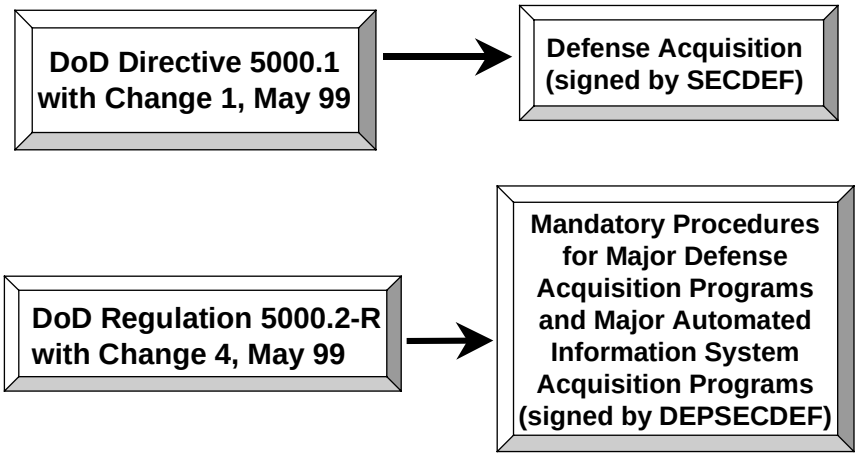
AP01, VG - 4


Department of Defense
Secretary of Defense
Dept of the Army
Dept of the Navy
Office of the Secretary of Defense
Chairman, Joint Chiefs of Staff
Dept of the Air Force
Defense Agencies
Joint Staff
UNIFIED COMMANDS
REGIONAL COMMANDS
U.S. European Command
U.S. Pacific Command
U.S. Atlantic Command
U.S. Southern Command
U.S. Central Command
FUNCTIONAL COMMANDS
U.S. Space Command
U.S. Special Operations Command
U.S. Transportation Command
U.S. Strategic Command
Unified Commands
AP01, VG - 5


Office of the Secretary of Defense
(with Defense Agencies)
as of November 1999
Secretary of Defense
Deputy Secretary of Defense
ASD (Legis Affairs)
ASD (Public Affairs)
Inspector General
ATSD (Intel Oversight)
Dir, Admin & Mgmt
General Council
USD (Policy)
PDUSD (Policy)
ASD (Strategy & Threat Reduction)
ASD (Special Ops & Low Intensity Conflict)
ASD (International Security Affairs)
Defense Security Cooperation Agency
USD (Personnel & Readiness)
ASD (Health Affairs)
ASD (Reserve Affairs)
ASD (Force Mgmt Policy)
Defense Commissary Agency
Director, Operational Test & Evaluation
USD (Acquisition Technology & Logistics)
PDUSD (Acq & Tech)
Dir, Def Research & Engineering
Defense Advanced Research Proj Agency
PDUSD (Logistics & Materiel Readiness)
Defense Logistics Agency
USD (Comptroller)
Dir, Pgm Analysis & Evaluation
Def Contract Audit Agency
Def Finance & Accounting Service
Defense Threat Reduction Agency
Ballistic Msl Defense Organization
acquisition matters
CIO & intel matters
ASD(Cmd, Control, Comm, & Intelligence)
National Imagery & Mapping Agency
Defense Information Systems Agency
Defense Security Service
National Recon Office
Defense Intelligence Agency
National Security Agency
Many of the positions on this chart are OSD "Principal Staff Assistants" (PSAs). PSA's are the USDs, the DDRE, the ASDs, DOTE, the General Counsel, the DoD IG, the ATSDs, and the OSD directors or equivalents, who report directly to the SECDEF or DEPSECDEF.
The PSAs represent the user community in the functional area under their direction on acquisition and requirements matters.
AP01, VG - 6

Acquisition Policy Documents

Dated March 15, 1996



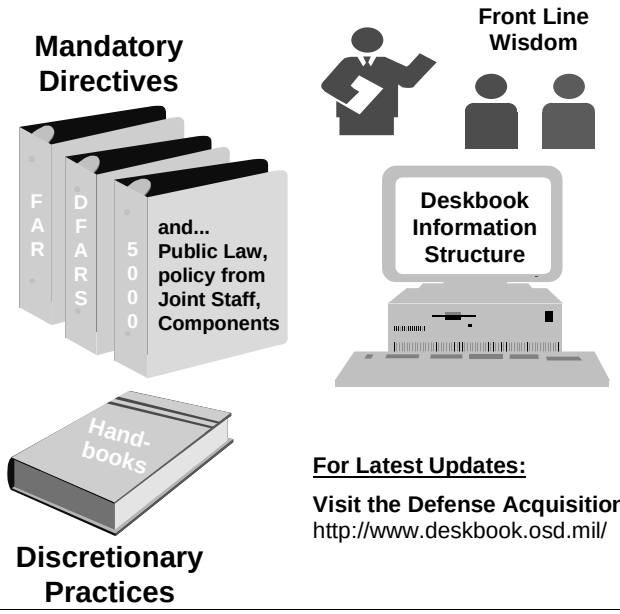
AP01, VG - 7

DoD 5000 Documents - Major Themes

- **Emphasis on teamwork**
- **Tailoring**
- **Empowerment**
- **Cost as An Independent Variable**
- **Commercial Products**
- **Best Practices**
- **Covers all defense systems (weapons & automated information systems)**

AP01, VG - 8

The Defense Acquisition Deskbook



Processes

1.1 Define Requirements
1.2 Plan Acquisition
1.3 Award Contract
1.4 Manage Program

For Latest Updates:

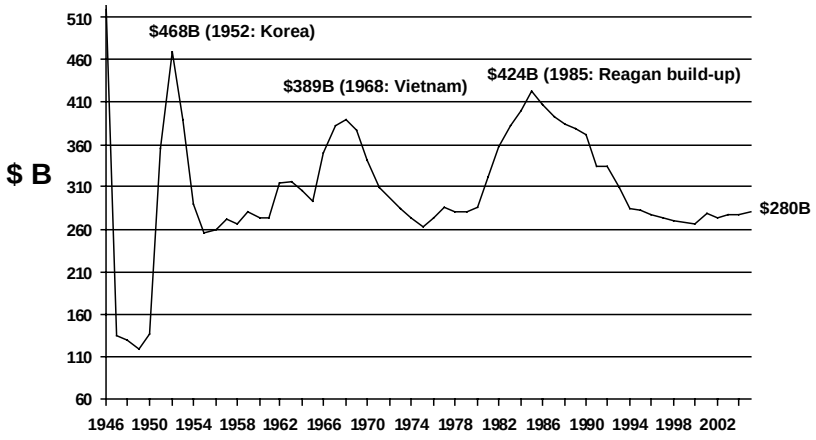
Visit the Defense Acquisition Deskbook Web Site.
http://www.deskbook.osd.mil/

AP01, VG - 9

Dept of Defense Budget Authority

FY 1946 - FY 2005

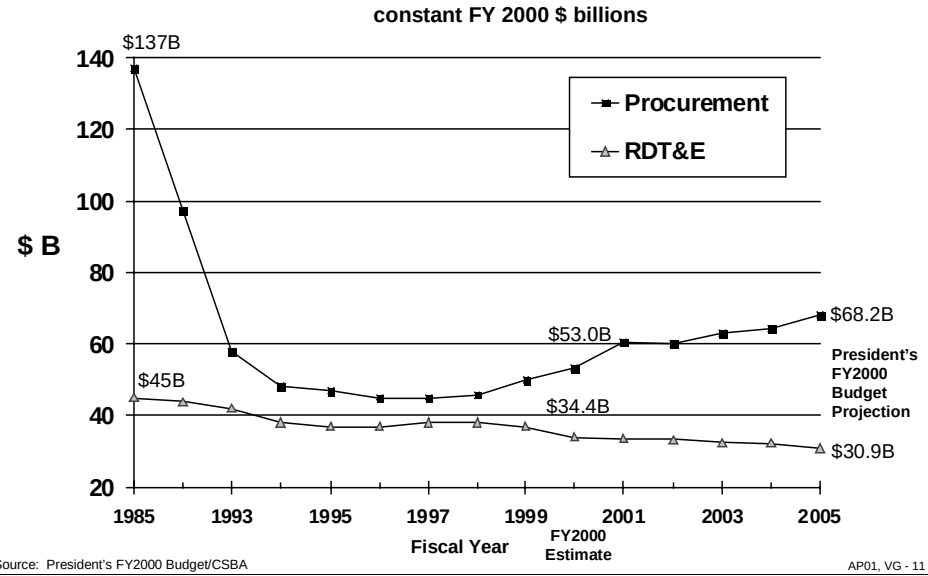
(FY 2000 constant dollars, billions)



Source(s): President's 2000 Budget/CSBA

AP01, VG - 10

Procurement & RDT&E Budget Authority 1985-2005



Source: President's FY2000 Budget/CSBA

AP01, VG - 11

Acquisition Reform

Will Help DoD Pay For Force Structure Modernization

A sampling of DoD Acquisition Reform initiatives

- **Non-Government Specifications and Standards**
- **Performance based specifications**
- **Cost as an Independent Variable (CAIV)**
- **Best Value Contracting**
- **Contractor past performance**
- **Single Process Initiative**
- **Integrated Product & Process Development & Integrated Product Teams (IPPD/IPT)**

and there's more on the next slide

AP01, VG - 12

More Acquisition Reform Policies (Cont.)

- Market Surveys
- Cycle time reduction
- Advanced Concept Technology Demonstrations (ACTD)
- Outsourcing/Privatization
- Open Systems Approach
- Commercial and Non-Developmental Items
- Modeling & Simulation
- Reduction in Total Ownership Cost
- Information Technology Management Reform Act (established CIO Requirement)

AP01, VG - 13

A SUCCESSFUL PROGRAM SHOULD...

- Produce operationally effective and suitable products
- Meet cost, schedule, performance objectives
- Implement IPPD using IPT's
- Generate reasonable profit
- Balance social, environmental and defense needs

AP01, VG - 14

AP 01 SUMMARY

- DoD Systems requirements respond to changing National Security Environment.
- PMO must integrate and synchronize successfully all Three Major Players as well as many outside influences.
- Defense Acquisition Deskbook includes mandatory directives, discretionary practices, front line wisdom and advice, and processes.
- Acquisition Reform initiatives influence every aspect of the acquisition process.
- Each major player has different roles and perspectives, but common program goals.

AP01, VG - 15

LESSON ASSIGNMENT SHEET

Lesson Number	AP 02
Lesson Title	Requirements Generation and Program Initiation
Lesson Time	2
Lesson Overview	This lesson addresses the DoD Requirements Generation System and the Acquisition Management System. It specifically addresses how requirements are determined and how the Requirements Generation System interacts with the Acquisition Management System for program initiation.
Terminal Learning Objective	Given a scenario, summarize the requirements generation system and procedures leading to potential program new start or modification.
Enabling Learning Objectives	• 1. Summarize key activities of the requirements generation system and the Concept Exploration Phase. • 2. Differentiate between basic research, applied research, advanced technology development and system development. • 3. Determine differences between Advanced Technology Demonstrations (ATD), Advanced Concept Technology Demonstrations (ACTD) and system acquisition programs. • 4. Delineate the steps leading to Program Initiation at Milestone I. • 5. Illustrate tailoring of milestones, phases and key activities. • 6. Identify the flow of acquisition authority from the acquisition executive to the Program Manager.

Assignments

- STUDY DoDD 5000.1 and DoD 5000.2-R, Parts 1, 2 and 3.
- STUDY the teaching notes included with this lesson:
- 1. Concept Exploration Phase.
- 2. Information Technology Systems Definitions.
- 3. The Program Executive Officer/Program Management Structure.
- SCAN attached charts.
-

ESPT

1

Assessment

Assessment vehicle for successful lesson completion is an Objective test

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Related Lessons

- AP 03, Phases and Milestones in Defense Acquisition

Self Study References

- Chairman of the Joint Chiefs of Staff Instruction 3170.01A, Requirements Generation System , 10 August 1999
- Joint Program Management Handbook (July 96), Chapter 4 and 5. (Defense Acquisition Deskbook)
- Buying Commercial and Nondevelopmental Items: A
- Handbook , April 1996, OUSD(A&T).
- Acquisition Process , DAD, Part 2.3.
- Considerations for AIS and Software Intensive Programs", DAD, Part 1.2.2.1.
- Defense Science and Technology Strategy
- Joint Warfighting Science and Technology Plan
- Basic Research Plan
- Defense Technology Area Plan
- Information Technology Management Reform Act

DEFENSE SYSTEMS MANAGEMENT COLLEGE
ACQUISITION POLICY DEPARTMENT

TEACHING NOTE

Concept Exploration Phase

G.J. Hagan, 18 November 1999

Background.

Prior to initiation of Concept Exploration (CE), mission needs are identified through mission area analysis of current and projected capabilities. These assessments are conducted by Military Departments, Defense Agencies, Unified Commands, Office of the Secretary of Defense (OSD), and the Joint Staff. Some examples of warfighting mission areas include: Army - Land Warfare and Fire Support; Navy - Joint Littoral Warfare and Strategic Sealift; Marine Corps - Amphibious Assault and Air Warfare; Air Force - Air Warfare and Strategic Offense.

Mission needs may seek to establish a new operational capability, improve an existing capability, or exploit an opportunity to reduce costs or enhance performance. Non-materiel solutions, such as changes in organizations, tactics, doctrine or training, are considered first. If non-materiel solutions do not accommodate the mission need, and the solution could result in a new acquisition program, the need is documented in a Mission Need Statement (MNS).[1]

MNS are reviewed, validated and approved by an "operational validation authority." Validation confirms that the need exists and cannot be resolved by a non-materiel solution. Approval is the formal sanction of the need described in the requirements documentation and certifies that the documentation has been subject to the process established by the DoD 5000 series. The operational validation authority also assesses joint Service potential, and sends approved MNSs to the appropriate acquisition milestone decision authority (MDA). The MDA conducts a Milestone 0 review to determine if concept studies are warranted.

Chiefs of the Military Services, Heads of Defense Agencies, and Commanders-in-Chief of Unified commands, validate and approve their own MNS for potential nonmajor defense acquisition programs (acquisition category (ACAT) II and III programs). The Joint Requirements Oversight Council (JROC), chaired by the Vice Chairman of the Joint Chiefs of Staff, is the MNS validation and approval authority for potential major defense acquisition programs (MDAPs - ACAT I). For potential major automated information system (MAIS - ACAT IA) programs, the OSD principal staff assistant (PSA)[2] and/or the JROC are the validation authorities. (The JROC will evaluate all potential Major Automated Information System (MAIS) programs and determine if JROC oversight is appropriate, or desired.

[1] Chairman of the Joint Chiefs of Staff Instruction 3170.01A, "Requirements Generation System", is the basic reference for requirements generation, to include review, validation, and approval of MNSs, Operational Requirements Documents (ORDs) and Capstone Requirements Documents (CRDs).

[2] PSAs are the Under and Assistant Secretaries of Defense; Director of Defense Research and Engineering; Director, Operational Test and Evaluation; DoD General Counsel; DoD IG; Assistants to the Secretary of Defense; and OSD directors or equivalents who report directly to the Secretary or Deputy Secretary of Defense. (See DoDD 5000.1 (w/c1), para 3.9).

Additionally, all automated information system (AIS) MNSs and ORDs, regardless of ACAT, must be submitted to J-8, Joint Staff for a determination of whether a JROC review is warranted).

The MDA for potential ACAT I programs is the Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)). The MDA for potential ACAT IA programs is the Assistant Secretary of Defense (Command, Control, Communications, and Intelligence) (ASD(C3I)). Component Acquisition Executives (CAEs) are MDAs for potential ACAT II programs, and a Program Executive Officer (PEO) or the commander of an acquisition command would normally be the MDA for potential ACAT III programs[3]. The MDA may delegate some ACAT I and IA programs to a CAE. ACAT ID programs are retained at the USD(AT&L) level for review by the Defense Acquisition Board (DAB), as appropriate. ACAT IAM are retained at the ASD(C3I) level for review by Information Technology Overarching Integrated Product Team (IT OIPT). ACAT IC and ACAT IAC programs are those delegated to the Components for review.

Based on a favorable assessment of the mission need by the operational validation authority, the MDA convenes a Milestone 0 review ("Approval to Conduct Concept Studies"). After a favorable review, the MDA issues an Acquisition Decision Memorandum (ADM) directing the study of alternative materiel solutions, the CE Phase begins, and concept studies are initiated with industry. The MDA also approves exit criteria for CE at Milestone 0, and may define a minimum set of cases to be considered in the Analysis of Alternatives (AoA)[4].

Phase Objectives.

Alternative system concepts are identified to satisfy the mission need. The focus is on competitive exploration of potential ideas, concepts and solutions, while working with industry and the user to generate innovation and determine trade-offs in capability, schedule and cost. Mission needs should not be oriented to known systems/products that may foreclose consideration of alternatives. Mission need solutions should be solicited primarily from private industry using competitive short-term study contracts. The need may be satisfied by a commercial or non-developmental item (NDI) approach to include foreign/allied technology and equipment. Compatibility, interoperability and integration are key goals that must be satisfactorily addressed for all acquisition programs. These goals must be specified and validated during the requirements generation process, and addressed by the PM starting in the CE phase.

Key Activities.

Activities during CE include reviewing experiences with similar systems, identifying viable alternatives, and assessing the threat (when applicable) to be countered. User involvement includes refinement of initial operational requirements and system readiness objectives.

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[3] DoD 5000.2-R (w/c4) eliminated the ACAT IV category. However, both the Army and the Navy decided to retain this category for internal classification purposes.

[4] AoA refers to a study of competing system concepts that assesses the cost and operational benefit of each alternative when compared with the others and the baseline (fielded) system. For AIS programs, a "Functional Economic Analysis" (FEA) may provide most of the information needed for an AoA. (See Defense Acquisition Deskbook, part 2.4.5).

Contractor proposals are evaluated to select the most promising system design concepts. During the evaluation of competing alternatives, trade-offs of performance, cost, and schedule are assessed to identify and reduce program risk. Key products of this phase are the operational requirements document (ORD), the program acquisition strategy, and the initial Acquisition Program Baseline (APB). The acquisition strategy is based on alternative(s) described by the ORD and outlines plans for overall system development, testing, production, support, and fielding. The APB contains cost, schedule and key performance parameters (KPPs) of the system proposed to meet the mission need. The KPPs and cost objectives and thresholds are drawn from the ORD. Each KPP is described in terms of an "objective" value, denoting desired level of performance, and a "threshold" value, denoting required level of performance. The threshold and objective level of performance may be the same for some KPPs. Interoperability is a mandatory KPP. Cost thresholds and objectives must be included in the ORD. They do not have to be designated as KPPs, but must be included in the cost section of the APB.

Alternative system concepts are reviewed in order to identify and analyze potential environmental consequences. Analysis includes environmental impacts of each alternative throughout the system's life cycle, potential mitigation of adverse impacts and how the environmental impacts and proposed mitigation measures affect alternatives, schedules and program costs.

The acquisition strategy should identify the process for transitioning required technologies into the phases of system development, as appropriate. Emphasis is on selecting the best system concept for the next phase, either Program Definition and Risk Reduction, or Engineering and Manufacturing Development. The acquisition strategy should also include planning for the use of prototypes and/or models and simulations, or an Advanced Technology Demonstration or Advanced Concept Technology Demonstration, to assess and reduce risk to the design of hardware and software systems and subsystems and to manufacturing processes.

Program exit criteria for the Program Definition and Risk Reduction Phase are developed for approval at Milestone I. Exit criteria should be major "show stoppers" tied to areas of program risk that require intensive management to ensure the program is ready to proceed past the next milestone. They must be measurable during the applicable phase, and normally consist of no more than three or four major data points or events. Exit criteria are not part of the APB, and are not intended to repeat or usurp the minimum requirements normally accomplished during a phase.

Information to support the Milestone I decision is prepared summarizing the results of the CE phase, and refining the acquisition strategy. This includes the development of a Test and Evaluation Master Plan (TEMP) and APB by the Program Management Office (PMO), a system threat assessment by the Component intelligence agency, an Operational Requirements Document (ORD) by the user, the conduct of an initial AoA, and others as necessary. Information to support milestone reviews is determined through the integrated product team (IPT) process and approved by the MDA. There is no "minimum set" of documents, beyond those statutorily required. DoD 5000.2-R prescribes these statutory requirements, and regulatory requirements for other information, such as the acquisition strategy. Applicable information should be incorporated into a single milestone review document to the maximum extent practicable.

During this phase, the Program Manager (PM) initiates planning for selected functional areas, e.g., logistics support, information assurance requirements, and information technology standards. Technical reviews[5] may be held to determine to what extent the selected system concepts satisfy the mission need.

During the CE phase, affordability is assessed and early life cycle cost estimates are made. These estimates are the basis for updating the Planning, Programming and Budgeting System (PPBS). The PM ensures sufficient funds are programmed in PPBS so that the system is fully funded in the Future Years Defense Program (FYDP) at Milestone I. The PM develops a program office estimate of life cycle costs for RDT&E, procurement, operations and support, and other associated costs. For AIS the PM develops an Economic Analysis (EA) consisting of a life-cycle cost estimate and a life-cycle benefits estimate. Another office within the Component may develop a cost assessment to validate the PM's estimate. The OSD Cost Analysis Improvement Group (CAIG) provides the MDA with an independent cost estimate for ACAT I programs starting at Milestone I. Independent cost estimates for ACAT IC programs may be delegated to the component cost analysis agency by the DAE. For ACAT IA programs, the PSA ensures a component cost analysis is accomplished.

Cost as An Independent Variable (CAIV)[6] objectives are developed by the PM, assisted by a Cost/Performance Integrated Product Team (CPIPT)[7] to facilitate cost performance trades. The focus should be on achieving savings in production and support costs by setting aggressive, realistic cost objectives and managing risks to obtain those objectives. It is important that the user, the PM and the other members of the CPIPT understand the affordability issues and the trade-offs in technical performance and schedule that may be necessary to keep the program within the MDA's affordability guidelines so that initial CAIV objectives may be established. These objectives must also be communicated to industry, and incorporated into the APB. The ORD should reflect this trade-off process by Milestone I; however, it is also important that the ORD reflect only the minimum number of performance threshold requirements appropriate to this early phase of the program.

Other Considerations for Information Technology (IT) Systems

Information technology (IT) programs include AIS and Command, Control, Communications, Computers, and Intelligence (C4I) systems. There are a variety of engineering, architectural, data structure, and interoperability issues that must be addressed in these programs. These include open systems design/environment, compatibility with the Joint Technical Architecture (JTA) and the Defense Information Infrastructure Common Operating Environment (DIICOE), compliance with the Shared Data Environment (SHADE) and adherence to the principles for describing operational, system and technical architectures delineated in the Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR)

[5] Technical reviews may be conducted as negotiated between the Program Management Office and the contractor(s). Commercial standards, such as EIA Standard IS-632 and IEEE Standard P-1220, describe some options for these reviews; however, these standards cannot be contractually required without a waiver from the MDA.
[6] See DoDD 5000.1, para 4.1.6
[7] A CPIPT is mandatory for DAB level programs. The CPIPT is normally led by the PM, or the PM's representative. A similar IPT should be used for non-MDAP programs.

Architecture Framework. Additional issues deal with Business Process Reengineering (BPR) prior to acquiring new AIS assets, system and data security and providing the requisite telecommunications infrastructure for anticipated transmission requirements. Additional information on these topics may be found in the Defense Acquisition Deskbook and various web sites maintained by the Defense Information Systems Agency (DISA), such as http://www.itsi.disa.mil and http://www.disa.mil.disahomejs.html.

Joint warfighting interoperability is a major concern for C4I systems and for AIS systems that interface with C4I systems. All C4I architectures must conform to the C4ISR Architecture Framework, version 2.0[8]. This framework has 3 architectural perspectives: an *operational architecture* which identifies missions/tasks to be executed and logical data flows and is defined by the *user* of the system; a *system architecture* which implements/satisfies the requirements contained in the operational architecture and consists of the computers, communications devices and software, and is defined by the *system developer*; and a *technical architecture* which provides the rules, standards, definitions and protocols for all system and/or subsystem design and acquisition and is defined by a standards body. The system architecture conforms to the standards contained in the technical architecture. Thus, a C4I system can expect to be described from each of 3 architectural perspectives: operational, system and technical. The Joint Technical Architecture (JTA)[9] is the governing technical architecture in DoD and is mandated for use by all C4I and AIS programs and the interfaces of other key assets, such as weapons and sensors, which interface with C4I systems. The JTA mandates use of the DIICOE. The standards body overseeing the JTA is an architectural working group with representatives from the OSD staff, the services, and the defense agencies under the direction of the ASD(C3I).

Interoperability requirements must first be certified and then later confirmed through field testing. Requirements Certification is the paper process which uses the MNS and ORD to ensure that interoperability is considered early in the requirements determination process. C4I MNSs and ORDs, and AIS MNSs and ORDs that must interface with C4I systems, (all ACATs) are sent to J-6 for interoperability certification. DISA is tasked to support the Joint Staff in this process. DISA certifies that the MNS/ORD meets interoperability requirements (or not) to the J-6, Joint Staff. The Joint Interoperability Test Command (JITC), an agency of DISA, will assist in the conduct of actual interoperability testing to confirm that the interoperability requirements have been satisfied.

Milestone I

End products of this phase include the initial ORD, a performance specification that defines the mission, technical performance requirements and systems interfaces, and a proposed acquisition program baseline (APB) containing cost, schedule, and performance thresholds and objectives.

[8] See joint USD(A&T)/Acting Assistant Secretary of Defense (C3I)/Director C4 Systems, Joint Staff memorandum, subject: Strategic Direction for a DoD Architecture Framework, 23 February 1998.
[9] See DoD 5000.2-R (w/c4), para 4.3.9, Interoperability.

Cost objectives in the APB reflect trade-offs made by the CPIPT using the CAIV process. A draft RFP for the next phase may be released to industry during Phase 0; however, the final RFP may not be released until after the Milestone I ADM is issued approving the PM's acquisition strategy.

DEFENSE SYSTEMS MANAGEMENT COLLEGE
ACQUISITION POLICY DEPARTMENT

TEACHING NOTE

Information Technology (IT) Systems Definitions
G.J. Hagan, 18 November 1999

The information below summarizes important definitions for Command, Control, Communications, Computers, and Intelligence (C4I) and automated information systems (AIS). Additional information is available in the Acquisition Deskbook.

- Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance (C4ISR) Architecture Framework: This architecture initiative was announced in a joint USD(A&T)/Acting ASD(C3I)/Director Joint Staff memorandum, subj: Strategic Direction for a DoD Architecture Framework, dated February 23, 1998. The framework notes that each C4I architecture has 3 architectural perspectives: an *operational architecture* consisting of missions/tasks to be executed and logical information/data flows representing the requirements which are defined by the *user;* a *system architecture* defined by the *developer* which is made up of the computer and communications hardware and software that meets the user's requirement defined in the operational architecture; and the technical architecture which is the set of standards/rules/protocols, i.e., the "building codes", that the developer uses when designing the system architecture to meet the user's requirements defined in the operational architecture. The *technical architecture* is under the control of a *standards body* apart from the system developer. For the purposes of DoD, the Joint Technical Architecture (JTA) is **THE** technical architecture required for C4I and AIS programs and the interfaces of key assets, such as weapons and sensors, with C4I systems. (The "standards body" for the JTA is an architectural working group with representatives from the OSD staff, services and defense agencies under direction of the ASD(C3I)).

    - Joint Technical Architecture (JTA): The JTA is the technical architecture for all C4I and AIS programs, including C4I Advanced Concept Technology Demonstrations (ACTDs) and C4I upgrades, and the interfaces of key assets, such as weapons and sensors, with C4I systems. Its purpose is to insure interoperability of all C4I systems and Automated Information Systems (AIS) across DoD forces, regardless of service. The JTA is identified in DoD 5000.2-R as mandatory as noted in paragraph 4.3.9, *Interoperability*:

"The DoD JTA is mandatory for all emerging systems and systems upgrades. The JTA applies to all Command, Control, Communications, Computers, and Intelligence (C4I) and automated information systems, and the interfaces of other key assets (e.g., weapon systems, sensors) with C4I systems. The Component Acquisition Executive may grant waivers to the standards in the JTA with the concurrence of the USD(A&T) and the ASD(C3I). Interoperability of systems shall be in compliance with DoDD 4630.5, DoDI 4630.8, and CJCSI 6212.01A."

As noted previously, the JTA has been described as a set of "building codes" (using a house analogy), that is, a set of interface standards/protocols for information format, transport and processing. (Analogy: local county and state building and electrical codes which specify everything from foundation features and what grade of copper wire may be used in the home to mandating that individual circuits be available for high amperage appliances. The builder must build homes in accordance with these construction and electrical codes).

- Defense Information Infrastructure (DII): The DII encompasses the assets and elements (communication networks, computers, software, databases and people) available to meet DoD's information needs. In other words, the sum total of the computer hardware, software, networks, databases and people that provide the MEANS to meet DoD's information needs. The key word is "infrastructure" meaning the underlying base or foundation. An "information infrastructure" provides a foundation for meeting information needs with its computer networks, network software, people who manage and operate the network and train people to use the network, etc. Operating systems and application specific software, known as the Common Operating Environment (COE), is the software portion of the DII.

- Common Operating Environment (COE) – also known as the Defense Information Infrastructure Common Operating Environment (DIICOE): If you consider the DII the superstructure, the COE provides a group of software components (operating systems and application specific software) that work within this superstructure that can be used to accomplish specific tasks across mission areas, such as in C4I or logistics. (The JTA mandates the use of the COE for C4I systems). The COE software components are supported on multiple operating systems (Windows NT, Windows 95 and UNIX) and servers. The Global Command and Control System (GCCS) and the Global Combat Support System (GCSS) are examples of C4I systems being built "on top of" the COE.

- Open Systems Environment (OSE): This is the evolving set of interfaces, services, formats, and interoperability and portability features which will allow DoD automated information systems (AIS) to be developed, operated and maintained INDEPENDENT of application-specific technical solutions or vendor products. In a true "open systems environment" data is accessed without regard to physical or electronic boundaries; that is, between intelligence gathering systems and operators, between a trooper in a foxhole and his support base or between DoD and its suppliers.

- Security considerations: Whether in an operational or administrative environment, the name of the game is preventing unauthorized users from reading, interrupting, corrupting, blocking, or otherwise folding, spindling or mutilating your information or transmission of same. These security requirements and implications must be considered "upfront" and be integrated into the development and acquisition process.

- Tailored IT standards planning: The AIS (or IT) program office must develop an Information Technology (IT) Standards Profile which delineates which IT standards (considered "solutions" for various service areas or functions) will be used to meet the functional requirements. The standards (and architecture) must be JTA compliant. "Legacy systems" are

AIS systems currently in place, some of which will be evolved ("migrated") to satisfy architectural requirements by the selection and implementation of appropriate IT Standards.

- Tailored IT data management: The data that's generated from an AIS (or IT) system must be compatible with the goals of shared data management. Otherwise, what good is interoperability if data from common databases cannot be accessed, distributed or received by elements of the DII? Again, this is an upfront consideration, which must be addressed by program planning.

- Shared Data Environment (SHADE): The SHADE initiative means that the data generated by users in (and outside of) the COE will be configured and stored in databases that can be accessed across the DII by SHADE compliant servers configured with appropriate interfaces. This is a tremendous task and entails designing or specifying the protocols and standard data structures which will allow qualified users access to the vast amount of data that resides in current (legacy) and future (migration) DoD data bases. Current data base management software in the COE includes Oracle, Sybase and Informix. The present focus of the SHADE initiative is on GCCS/GCSS data support implementations.

- Telecommunications planning: Some AISs may have significant requirements for remote accessing and distribution across the telecommunications net. The number and type of circuits to carry the intended traffic must be addressed. A telecommunication plan may begin development in the Concept Exploration Phase. It addresses types and classification of data that will be transmitted, anticipated data traffic volume, required communications interfaces, and long haul and local communication network needs and security requirements. By Milestone I, this planning should include the telecommunications architecture that will accomplish the mission.

- Information System: Any combination of IT and related resources that function together to produce the capabilities required to fulfill a mission need, including hardware, ancillary equipment, software, but excluding construction or other improvements to real property.

- National Security System (NSS): Any information technology in support of telecommunications or information systems operated by the United States Government, the function, operation, or use of which

    - involves intelligence activities;

    - involves cryptologic activities related to national security;

    - involves command and control of military forces;

    - involves equipment that is an integral part of a weapon or weapons system; or

    - is critical to the direct fulfillment of military or intelligence missions, except that such a system is not a NSS if it is to be used for routine administrative and business applications (including payroll, finance, logistics, and personnel management applications).

- Command, Control, Communications, Computers, Intelligence (C4I) Systems: Any system featuring all or a subset of the following: Communications, automated information, or intelligence systems or equipment that *assist the commander in planning, directing, and controlling forces*. C4I systems consist of hardware, software, personnel, facilities, and procedures and represent the integration of information (including data), information processing, and information transfer systems organized to collect, produce, store, display, and disseminate information. [C4I systems are both information systems and National Security Systems].

- Automated Information Systems (AIS): Computer hardware, computer software, telecommunications, information technology, personnel, and other resources that collect, record, process, store, communicate, retrieve, and display information. An AIS can include computer hardware, computer software, or a combination of the above. [AIS are information systems – an AIS could conceivably be an NSS. AIS are usually associated with the performance of administrative and business functions (e.g., payroll and accounting), and thus are not considered C4I systems].

- Global Information Grid (GIG): Joint Staff concept which intends to advance DoD beyond the current DII and fuse information superiority with weapon systems to enable "full spectrum dominance" for 2010 and beyond (as described in Joint Vision 2010). The GIG envisions a baseline capability integrating all C4ISR requirements – strategic, operational, tactical, and base/post/camp/station/ship – to provide flexible, assured bandwidth to warfighters regardless of environment. The GIG will include all owned and leased communications and computing systems and services, software (including applications), data, security services, all National Security Systems, and other associated services necessary to achieve information superiority.

DEFENSE SYSTEMS MANAGEMENT COLLEGE
ACQUISITION POLICY DEPARTMENT

TEACHING NOTE

The Program Executive Officer /Program Management Structure[10]

C. B. Cochrane, 9 March 1999

In July, 1989 Secretary of Defense Cheney submitted the Defense Management Report (DMR) to the President. The DMR was the plan to fully implement the 1986 Packard Commission recommendations on improving management of the Defense Department. One of the Commission's major recommendations was to streamline the Program Manager's (PM's) reporting chain, with clear lines of authority from the Under Secretary of Defense (Acquisition & Technology) through full-time Service Acquisition Executives (SAEs), and full-time Program Executive Officers (PEOs), to the individual PMs of major defense acquisition programs. The Army, Navy and Air Force each embraced this requirement in a slightly different manner.

The Army was the first to create a PEO structure independent from its materiel commands. The Army took action early in 1987, prior to the DMR, to comply with the implementation of the Packard Commission Report in accordance with National Security Decision Directive 219, signed by President Reagan on 1 April 1986. The Army created twenty-two PEOs who, along with one direct reporting PM, reported directly to the Army Acquisition Executive. Since 1987 the Army has refined and streamlined this PEO structure. Currently the Army has eight PEOs, and three direct reporting PMs (DRPMs).

Army PEOs include: Intelligence, Electronic Warfare and Sensors; Standard Army Management Information Systems; Command, Control, and Communications Systems; Ground Combat and Support Systems; Tactical Missile Systems; Aviation; and, Air and Missile Defense. These PEOs, and the PMs for Biological Defense (Joint Program Office), Chemical Demilitarization, and the Joint Tactical Radio System, report directly to the Assistant Secretary of the Army (Acquisition, Logistics and Technology), the Army Acquisition Executive (AAE). These PEOs are co-located with their PMs at the major subordinate commands of the Army Materiel Command. An additional PEO, Reserve Component Automation System (RCAS), reports to the Chief, National Guard Bureau, who coordinates all programmatic matters with the AAE.

The Navy implemented the PEO concept in 1986 by "dual-hatting" the commanders of the Systems Commands (SYSCOMS) as PEOs for assigned programs. In 1990, to comply with Secretary Cheney's DMR, the Navy created eight PEOs independent from the SYSCOMs. The Navy now has eleven PEOs and three direct reporting PMs: Tactical Aircraft Programs; Air Antisubmarine Warfare, Assault & Special Mission Programs; Cruise Missiles and Joint Unmanned Aerial Vehicles; Aircraft Carriers; Submarines; Undersea Warfare; Mine Warfare; Theater Air Defense/Surface Combatants; Space, Communications and Sensors; Expeditionary Programs, and DD-21. Direct reporting PMs are: Strategic Systems, and the Marine Corps' Advanced Amphibious Assault program. Navy PEOs are co-located with their PM's and the Navy SYSCOMS.

[10] The Army, Navy, Air Force and USSOCOM have PEOs. Other DoD Components (such as DISA and DLA) manage acquisition programs, but do not have PEOs.

Navy PEOs and DRPMs report to the Assistant Secretary of the Navy (Research, Development and Acquisition), the Navy Acquisition Executive. The PEO for Joint Strike Fighter also reports to the Navy Acquisition Executive[11].

The Air Force, which had followed the Navy by dual-hatting Product Center Commanders as PEOs, complied with the DMR by creating six independent PEOs, and one direct reporting PM, reporting directly to the Assistant Secretary of the Air Force (Acquisition) (SAF/AQ), the Air Force Acquisition Executive. The one direct reporting PM (B-2), was later placed under a PEO. Currently, the Air Force has six PEOs: Airlift and Trainers; Fighters and Bombers; Weapons; Warning Surveillance and Control; Logistics Systems; and Space. Air Force PEOs are located with SAF/AQ in the Pentagon.

Although the military departments have established PEOs as separate entities from the materiel commands, these commands play a major role in the acquisition process, without duplicating any of the management functions of the PEOs or PMs. A large role for these commands, and the major Defense Agencies, is in the management of programs that are not under the PEO structure. In fact, although PEO programs are generally the largest programs and consume a major portion of the research, development and acquisition budget, the majority of the PM's manage nonmajor programs and report into an acquisition command or Defense Agency.

The Army Materiel Command (AMC) and its major subordinate commands provide support to the PEO structure by a matrix arrangement to augment the relatively small PEO/PM offices. This arrangement has been improved by establishment of a system to allow PEOs and subordinate PMs to draw personnel and dollars directly from Headquarters, Department of the Army. AMC manages most of the Army's non-PEO managed acquisition programs, provides logistics support to the fielded Army, manages the laboratory, arsenal, and depot systems, and provides legal, contracting, engineering and other matrix support to PEOs and PMs. In addition to AMC, the Army has four other major materiel developing commands with PMs: Space and Missile Defense Command, Intelligence and Security Command, Military Traffic Management Command, and the Medical Research and Materiel Command.

Unlike the Army, the Air Force Materiel Command's (AFMC) headquarters is not involved in the management of non-PEO programs. AFMC Product and Logistics Center Commanders (called "Designated Acquisition Commanders, or DACS") manage non-PEO programs, reporting directly to the AFAE for matters pertaining to those programs. These centers also provide appropriate life cycle support to all programs, and matrix support for PEO managed PMs.

The Navy Materiel Command was deactivated prior to the Packard Commission Report. The Navy's Systems Commands manage all programs not assigned to PEOs, provide matrix support to the PEO structure, and provide logistics support throughout the life cycle of the program

In the late 1980's the U.S. Special Operations Command (USSOCOM) was directed by the DEPSECDEF, based on the desires of Congress, to develop their own Program Objectives Memorandum (POM), and to budget for special operations unique equipment.

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[11] Joint Strike Fighter rotates between the Navy and Air Force; reporting to the opposite service. Currently, the PEO is an Air Force BGen reporting to the Navy Acquisition Executive.

Parallel to the establishment of an organizational structure for programming and budgeting, CINC USSOCOM also established an acquisition command, with an Acquisition Executive, Program Executive Officers, and program managers. Currently USSOCOM's Special Acquisition and Logistics Center (SOAL) has four PEOs: Special Programs; Intelligence and Information Systems; Fixed Wing Systems; and Maritime and Rotary Systems. Many of the programs under these PEOs are managed by the military departments, with a PM at SOAL providing oversight and funding.

Many Defense Agencies also have a program management structure; however, at the present time these Agencies do not have any PEOs. Their are about 20 major automated information system (MAIS) acquisition programs being managed by the Defense Agencies, with the Defense Information Systems Agency (DISA), and the Defense Finance and Accounting Service with the lion's share. Small numbers of MAIS acquisition programs are managed by the National Imagery and Mapping Agency (NIMA), the Defense Intelligence Agency (DIA), the National Security Agency (NSA), the Defense Commissary Agency (DeCA), and the Defense Logistics Agency. The Ballistic Missile Defense Organization (BMDO) funds six ACAT ID programs; however, the PM's for these programs are located with a lead military service.

A challenge facing each Component is how to use the experience of senior staff personnel assigned to their headquarters to assist the PEOs and PMs, without injecting themselves into the chain-of-authority. Further, resources to staff large autonomous PM offices are not available, so matrix support to the PEO/PM structure must compete with requirements to support the large number of programs remaining under the acquisition commands and agencies.

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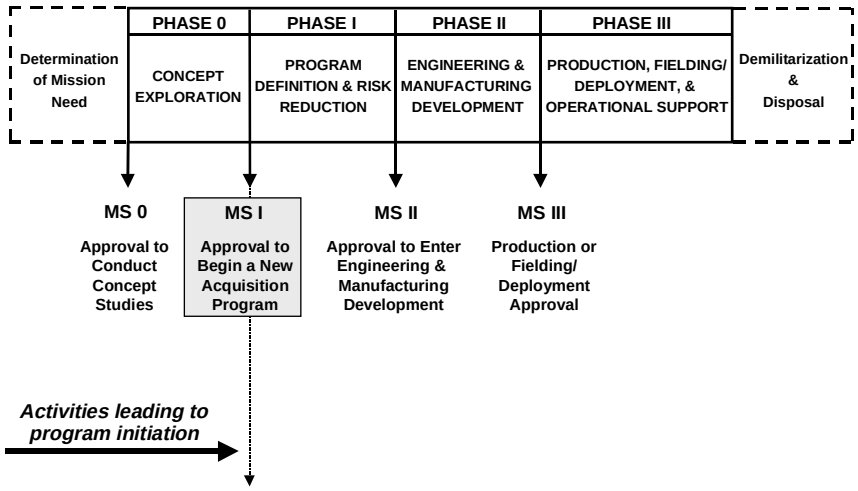
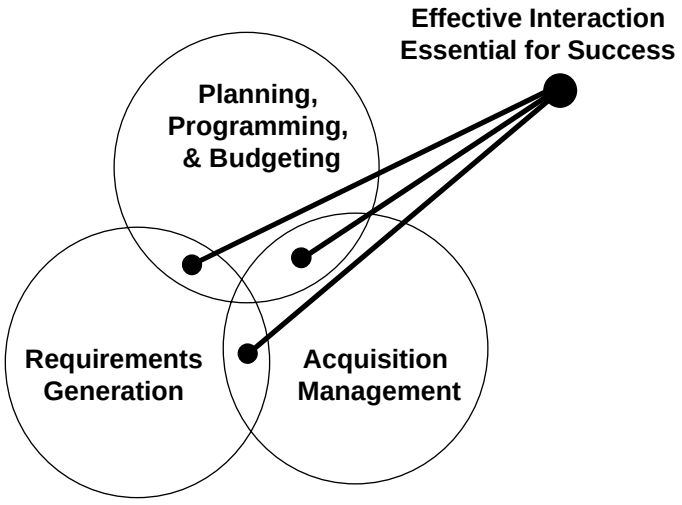
Defense Acquisition Milestones and Phases



AP02, VG-1

Three Major Decision Support Systems



AP02, VG - 2

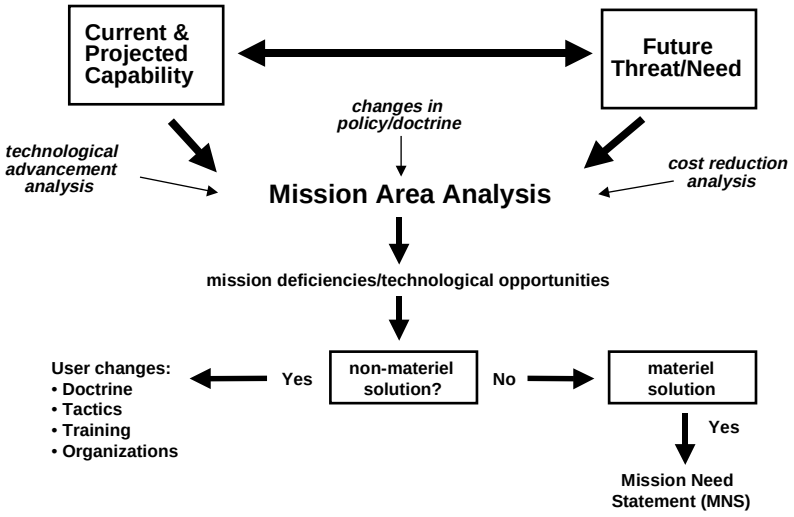
Acquisition Categories (ACAT)

Major Defense Acq Pgms	**ACAT 1D:**	• DAB review • Designated by DAE • Decision by DAE	$355M RDT&E or $2.135B Procurement (FY96 Constant $)
	ACAT IC:	• Component review • Designated by DAE • Decision by Svc Sec/CAE	
Major AIS Acq Pgms	**ACAT IAM:**	• ITOIPT review • Designated by ASD(C^3I) • Decision by ASD(C^3I)	$360M Life Cycle Cost or $120M Total Prog. Cost or $30M Prog. Cost in any single year (FY96 Constant $)
	ACAT IAC:	• Component review • Designated by ASD(C^3I) • Decision made by Component Chief Information Officer	
Major Systems	**ACAT II: ***	• Does not meet ACAT I Criteria • Designated by Svc Sec/CAE • Decision by Svc Sec/CAE	$135M RDT&E or $640M Procurement (FY96 Constant $)
all other systems (except for Army Navy, USMC)	**ACAT III:**	• Does not meet ACAT I, IA or II Criteria • Designated IAW Component policy • Decision at lowest appropriate Level	No Fiscal Criteria
Army Navy USMC	**ACAT IV:**	• Not otherwise designated ACAT I, IA, II or III • Designated IAW Component policy • Navy/USMC ACAT IVT/IVM • Decision at lowest appropriate level	See AR 70-1 (Army) & SECNAVINST 5000.2B (Navy and Marine Corps)

*Army has an ACAT IIA category for AIS reviewed at Army CIO level

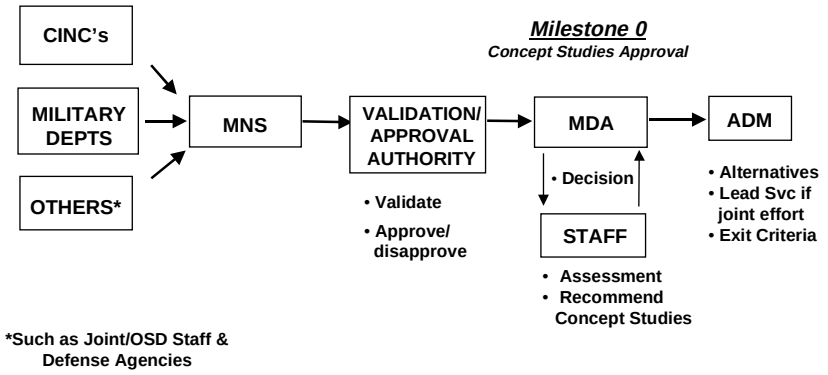
AP02, VG - 3

Mission Need Determination



AP02, VG - 4

Mission Need Statement (MNS) Flow



AP02, VG - 5

Science & Technology

- **Basic Research** - **Discover new knowledge in scientific fields relevant to national security**
  - Farsighted, high payoff research and critical enabling technologies to support Acquisition Process
  - Avoid technological surprises - Create tech surprises for our adversaries
  - Usually conducted at defense labs/universities
- **Applied Research - Builds on Basic Research to pursue solutions to broadly defined military needs**
  - Proof-of-concept experiments & evaluations built around bread-board hardware, models & laboratory experiments
  - Nonsystem specific - often focuses on subsystems/components
- **Advanced Technology Development - Builds on Applied Research to move into development & integration of hardware for field experiments and tests.**
  - Development of components, subsystems, advanced technology demonstrators (ATD) (hardware and/or software) with potential application to major platforms (e.g., aircraft, ships, missiles, tanks) and Advanced Concept Technology Demonstrations (ACTD)

AP02, VG - 6

Advanced Concept Technology Demonstrations (ACTD)

Objective: Assess utility of near-term fieldable solutions to military needs as validated by JROC

- **Parallel demonstrations of mature or emerging technology with corresponding operational concepts**
- **Interim leave-behind capability essential to evaluation and continued refinement of solutions to operational issues and to support early military capability**
- **Support rapid transition into formal acquisition process when military utility is established and if additional units required**
- **Strong user involvement essential to successful ACTD**

AP02, VG - 7

Acquisition Program vs. ATD & ACTD

	Acquisition Program	Advanced Technology Demonstration (ATD)	Advanced Concept Tech Demonstration (ACTD)
Motivation	• Develop, produce and field system • Cost, schedule, performance	• Demonstrate feasibility and maturity • Reduce technical risks and uncertainties at relatively low cost	• Gain understanding of and evaluate utility prior to acquisition decision • Develop concepts of operation and doctrine
Requirement	MNS/ORD	not required	User sponsor & JROC prioritization
Oversight	milestone decision authority	labs/R&D centers	DUSD(AS&C) Oversight Panel
Funding	fully FYDP funded	RDT&E	RDT&E (2 yrs in field)
ACAT	all ACATs	not ACAT effort	not ACAT effort
Configuration & Testing	system/subsystem prototypes DT/OT	technology demonstrations	tech demonstrations in field environment with users
Rules	DoD 5000 series/FAR	informal/FAR/OTA	DAD 2.2.1/FAR/OTA
Role of User	max involvement	some involvement	max involvement

ACAT: Acquisition Category
DAD: Defense Acquisition Deskbook
DT/OT: Developmental/Operational Testing
DUSD(AS&C): Dpty Under Sec Def (Advanced Systems & Concepts)
FAR: Federal Acquisition Regulation
FYDP: Future Years Defense Program
MNS: Mission Need Statement
ORD: Operational Requirements Document
OTA: Other Transaction Authority
RDTE: Research, Development, Test & Evaluation (appropriation)

AP02, VG - 8

S&T Link to Systems Development & Acquisition

- Supports traditional acquisition process
- Assists in trade-off analysis
- Reduces technology risk to development
- Technology insertion opportunities
  - ATDs: Demonstrate break-through technologies that can support program starting or already in acquisition process
  - ACTDs: Non-traditional acquisition technique to rapidly insert mature technology directly into warfighter's arsenal
- CE phase managers must coordinate with S&T activities/agencies for technological opportunities
- Users MUST be involved

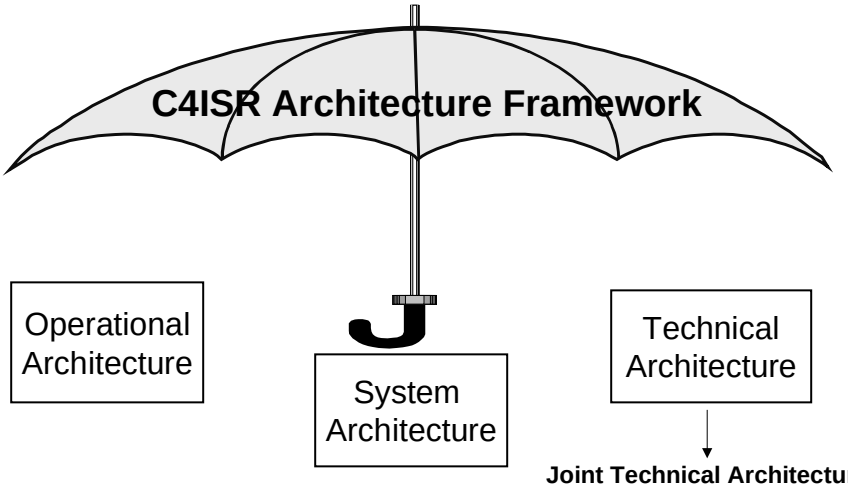
AP02, VG - 9

C4ISR Architecture Framework [ver 2.0]

- Established as strategic direction for all DoD C4ISR architectures
- Complies with ITMRA direction for CIO's to develop an agency-wide architectural model and Information Technology Architecture (ITA)
- All planned or on-going C4ISR architectures must developed in accordance with the C4ISR Arch Framework, and existing architectures must be redescribed in accordance with the framework
- Will be evaluated as the architectural basis for all functions (domains) within DoD

AP02, VG - 10

Three Architectural Perspectives



*Mandated by DoD 5000.2-R, para 4.3.9, Interoperability

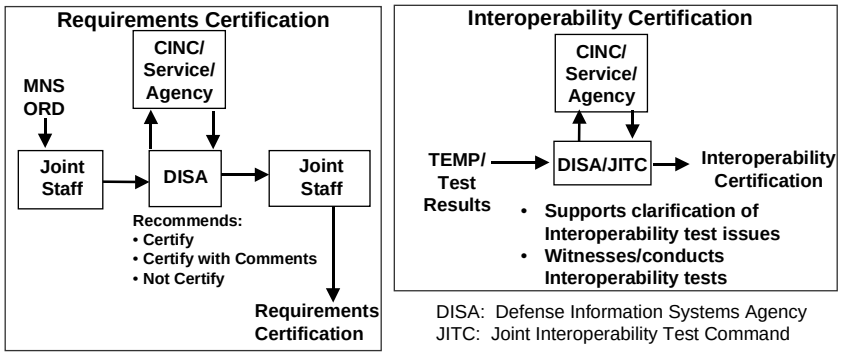
AP02, VG - 11

C4ISR Interoperability

DoD Policy: (CJCSI 6212.01A)

- All C4I systems developed for use by U.S. forces are considered to be for Joint use.
- All C4I requirements shall be reviewed/updated at every milestone
- Joint Staff will certify all MNS & ORDs for conformance with Joint C4I Policy & Doctrine, architectural integrity, and interoperability standards.

Certification



DISA: Defense Information Systems Agency
JITC: Joint Interoperability Test Command

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Concept Exploration

Objectives:

- **Explore materiel alternatives to satisfy mission need**
- **Define most promising system concept(s)**
- **Identify high risk areas and risk management approaches**
- **Develop proposed acquisition strategy and Cost as an Independent Variable (CAIV) objectives**
- **Develop initial cost, schedule and performance objectives**

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Materiel Alternatives

(Order of Preference IAW DoDD 5000.1)

1. **Use or modification of:**
   - **commercially available systems or equipment**
   - **already-developed U.S. or Allied equipment (NDI)**
2. **Cooperative development with one or more Allied Nations**
3. **New Joint-Service development program**
4. **New service-unique development program**

AP02, VG - 14

Commercial and Non-Developmental Items

- **Benefits:**
  - **Lower life-cycle costs**
  - **More rapid deployment**
  - **Proven capability**
  - **Increased competition**
- **Additional benefits of commercial items:**
  - **Broader industrial base**
  - **Access to state of the art technology**

Source: SD-2, "Buying Commercial and Nondevelopmental Items: A Handbook", April 1996, OUSD(A&T)

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Concept Exploration (CE)

What Needs To Be Done:

- **Form IPTs to facilitate decision-making**
- **Conduct Market Research and Analysis**
- **Conduct AoA and select preferred alternative**
- **Conduct cost performance trade-offs**
- **Complete ORD (User/User Rep)**
- **Develop draft performance specification**
- **Identify potential environmental consequences**
- **Prepare life-cycle cost estimate (including life cycle benefit analysis for AIS programs)**

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Concept Exploration (CE)

What Needs To Be Done (Continued):

- **Ensure full funding in FYDP**
- **Develop initial acquisition strategy**
- **Prepare contract package for next phase (AP, RFP)**
- **Prepare C^4I Support Plan (for all systems that interface with C^4I systems)**
- **Formulate initial APB and TEMP**
- **Meet exit criteria for CE phase**
- **Propose exit criteria for PDRR phase**
- **Prepare information for MS I**

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Acquisition Strategy: What is it?

- **OVERARCHING STRATEGY - guides entire acquisition process**
- **ROAD MAP - how program will be managed and controlled**
- **EVOLVES THROUGH AN ITERATIVE PROCESS - becomes more definitive as program progresses**
- **TAILORED FOR EACH PROGRAM**
- **Developed/updated by PM in coordination with working-level Integrating Product Team(s) (WIPT)**
- **Approved through acquisition management channels**

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Acquisition Strategy Elements

(ACAT I & IA Programs)

- Open Systems Objectives
- Sources
  - ✓ Commercial & NDI
  - ✓ Dual Use Technologies & Use of Commercial Plants
  - ✓ Critical Product and Technology Competition
  - ✓ Industrial Capability (10 USC 2440)
  - ✓ Leasing
- Cost, Schedule, and Performance Risk Management
- Cost As an Independent Variable
  - ✓ Cost Performance Trade-Offs
  - ✓ Cost Management Incentives
- Contract Approach
  - ✓ Competition
  - ✓ CALS-Integrated Data Environment
  - ✓ Cost Performance
  - ✓ Advance Procurement *
  - ✓ Best Practices
  - ✓ Integrated Baseline Reviews
- Management Approach
  - ✓ Streamlining
  - ✓ Information Sharing & Oversight
  - ✓ International Cooperation (10 USC 2350) *
  - ✓ Assignment of PEO
  - ✓ Use of DCMC Tech Support
  - ✓ Joint Program Management
- Environmental, Safety, & Health Evaluation (42 USC 4321-47)
- Modeling and Simulation
- Source of Support
- Warranties
- Government Property in Possession of Contractors

* Normally not applicable to AIS programs

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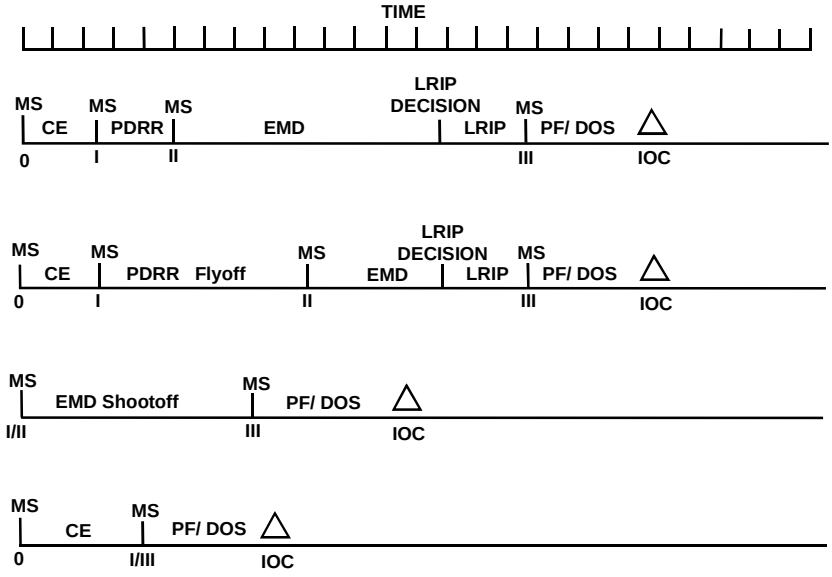
Tailored Program Structures

What do they tell us about the program?



AP02, VG - 20

Characterizing CE

- Relatively short, intense period of activity to define most promising system concept(s)
- Short-term study contracts with industry
- Maximum competition
- Innovation to satisfy requirements
- Uncertainty is high
- Thorough planning critical to success

BOTTOM LINE: Is New Development Program Justified ???

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Acquisition Decision Memorandum (ADM) Milestone I

- Approves entry into next phase (normally Program Definition and Risk Reduction Phase)
- Documents resource decisions / affordability constraints & CAIV objectives
- Approves Acquisition Strategy & Acquisition Program Baseline
- Establishes Exit Criteria for next phase

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LESSON ASSIGNMENT SHEET

Lesson Number	PM 1
Lesson Title	Implementing IPPD Through IPTs
Lesson Time	3
Lesson Overview	This lesson describes the Integrated Process and Product Development (IPPD) concept and its benefit to the DoD acquisition process. It shows how Integrated Product Teams (IPTs) are a tool used to implement the IPPD concept and discusses the basic categories of IPTs. Students will learn the major principles of team leadership and followership and receive practice in applying these principles.
Terminal Learning Objective	Given a scenario, apply the Integrated Product & Process Development (IPPD) concepts and processes necessary to effectively lead and participate in an Integrated Product Team (IPT)
Enabling Learning Objectives	• Relate the key tenets of IPPD to planning and executing an acquisition program. • Identify the barriers to successful IPT implementation. • Discover how different leadership styles impact the effectiveness of a team. • Working in a student-led IPT, demonstrate the behaviors and characteristics of an effective team.

Assignments	• STUDY: DoD Guide to Integrated Product and Process Development (Excerpts), Version 1.0, USD (A&T), February 5, 1996. Sections on IPPD Key Tenets, Integrated Product Teams, and Expected Benefits of IPPD. Full version available at http://www.acq.osd.mil/te/survey/table_of_contents.html • STUDY: Teaching Note: "Using Teams in the Acquisition Process" by John Kelley • STUDY: Teaching Note: "Building Effective Teams" by John Kelley • STUDY: Teaching Note: "Program Office Organization" by N.A. McDaniel
ESPT	1.25
Assessment	Assessment vehicle for successful lesson completion is:,Multiple choice examination,
Related Lessons	• The following are related lessons that support the terminal learning objective: • PM 2 • PM 3 • All integrated exercises
Self Study References	• None

Excerpts from

DoD Guide to
Integrated Product and Process Development

(Version 1.0)

February 5, 1996

OFFICE OF THE UNDER SECRETARY OF DEFENSE
(ACQUISITION AND TECHNOLOGY)
WASHINGTON, DC 20301-3000

Chapter 1 IPPD Concept

Introduction

> **"...I am directing a fundamental change in the way the Department acquires goods and services. The concepts of IPPD and IPTs shall be applied throughout the acquisition process to the maximum extent practicable."**
>
> **from SECDEF Memo of 10 May 1995**

The Department of Defense (DoD) has worked to find the best methods for reengineering its processes. Several studies have addressed the benefits of using Integrated Product and Process Development (IPPD). IPPD has been successfully used by the private sector and by the Services on selected programs to reduce product cost and to field products sooner.

In "Acquisition Reform: A Mandate for Change," the Secretary of Defense concluded,

> "(DoD) must reduce the cost of the acquisition Process by the elimination of activities that, although being performed by many dedicated and hard-working personnel, are not necessary or cost effective in today's environment."

DoD must shift from an environment of regulation and enforcement to one of incentivized performance. The objective is to be receptive to ideas from the field to obtain buy-in and lasting change.

IPPD has been mandated for the Department of Defense. IPPD is a management technique that simultaneously integrates all essential acquisition activities through the use of multidisciplinary teams to optimize the design, manufacturing, business**,** and supportability processes.

At the core of IPPD implementation are Integrated Product Teams (IPTs) that organize for and accomplish tasks that acquire goods and services. These multifunctional teams are the foundation of the process. The IPT decision-making processes and the empowerment of the teams may require cultural change in the way decisions are made in the Department. The Under Secretary of Defense (Acquisition & Technology) has recently identified critical changes that must take place in DoD in order for successful IPTs to be formed. He indicated that DoD must move away from a pattern of hierarchical decision making to a process where decisions are facilitated across organizational structures by IPTs.

> "It means breaking down institutional barriers. It also means that our senior management staffs are in a *receive* mode - not just a *transmit* mode."

This guide is a primer on IPPD. Nothing in this guide should be construed as directive in nature. *Any processes described are examples. Those processes actually used should be decided upon at the appropriate time by the implementing organization and tailored for each application.*

Background

IPPD has its roots in integrated design and production practices, concurrent engineering, and total quality management. In the early 1980s, U.S. industry used the concept of integrated design as a way to improve global competitiveness.

Industry's implementation of IPPD expanded concurrent engineering concepts to include all disciplines, not just technical, associated with the design, development, manufacture, distribution, support, and management of products and services. Diverse segments of U.S. industry have successfully implemented this concept to become recognized leaders in IPPD practices, most notably in the auto and electronics industry. Many corporations have institutionalized the IPPD process and associated training programs. Several of these corporations were consulted in the development of this guide.

Several government actions led to the Department of Defense (DoD) formally adopting IPPD principles. These include:

The Federal Acquisition Streamlining Act of 1994

Among other things, this legislation simplified acquisition of commercial items and allowed DoD to explore innovative acquisition procedures under DoD's statutory pilot program authority.

Reengineering the Acquisition Oversight and Review Process

The Secretary of Defense chartered this effort to provide a road map of the needed changes in the oversight and review process while maintaining the DoD acquisition system's guiding principles of meeting the warfighter's needs.

Defense Manufacturing Council Review of Office of the Secretary of Defense (OSD)/Service Oversight

The report of this work proposed paradigm changes in OSD/Service oversight by shifting from regulation and enforcement to incentives; from functional isolation to integrated team action; from performance focus to looking at cost as an independent variable; from classic acquisition to a tailored, innovative approach; and from end-item focus to emphasis on the total system to include life-cycle products and processes.

Defense Science Board Report on Engineering in the Manufacturing Process (March 1993)

This task force study recommended a shift from product focus to process focus with primary emphasis on value and solution rather than performance and schedule. As had been stated in previous Defense Science Board studies, superior products result when the manufacturing processes are well understood in the development phase.

These efforts encouraged the Under Secretary of Defense for Acquisition and Technology (USD(A&T)) to issue a memorandum to reengineer the DoD acquisition oversight and review process by directing the use of multidisciplinary teams rather than the traditional functional process. In May 1995, the Secretary of Defense issued a memorandum which broadened the scope of the USD(A&T) memorandum by directing full implementation of IPPD and IPTs in the DoD acquisition process. This guide provides suggestions on the implementation of IPPD in DoD acquisition.

IPPD Concept

DoD defines IPPD as, "A management process that integrates all activities from product concept through production/field support, using a multifunctional team, to simultaneously optimize the product and its manufacturing and sustainment processes to meet cost and performance objectives." IPPD evolved from concurrent engineering, and is sometimes called integrated product development (IPD). It is a systems engineering process integrated with sound business practices and common sense decision making. Organizations may undergo profound changes in culture and processes to successfully implement IPPD.

IPPD activities focus on the customer and meeting the customer's need. In DoD, the customer is the user. Accurately understanding the various levels of users' needs and establishing realistic requirements early in the acquisition cycle is now more important than ever. Trade-off analyses are made among design, performance, production, support, cost**,** and operational needs to optimize the system (product or service) over its life cycle. In order to afford sufficient numbers of technologically up-to-date systems, cost is a critical component of DoD system optimization. Cost should not simply be an outcome as has often been the case in the past. Thus, cost should become an independent rather than dependent variable in meeting the user's needs.

Although there are common factors in all known successful IPPD implementations, IPPD has no single solution or implementation strategy. Its implementation is product and process dependent. A generic IPPD iterative process is shown in figure 1-1.

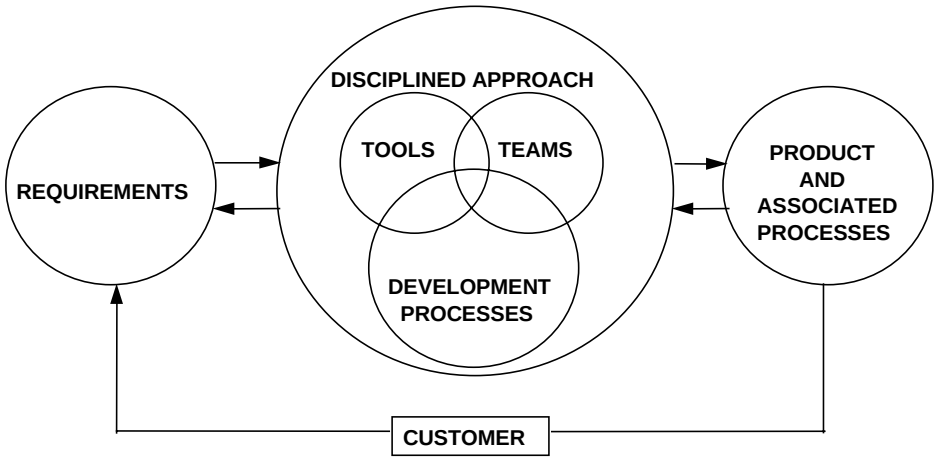

Figure 1-1. A Generic IPPD Iterative Process

Resources applied include people, processes, money, tools, and facilities. The IPPD process reorders decision making, brings downstream and global issues to bear earlier and in concert with conceptual and detailed planning, and relies on applying functional expertise in a team-oriented manner on a global-optimization basis. It is necessary to understand early the processes needed to develop, produce, operate and support the product. Equally important are these processes' impacts on product design and development. Basic elements of the iterative process are:

Requirements, a first step in the iterative process above, are generated by the customer in a negotiation among many parties, each with serious and important concerns. Knowing and understanding the customers (command structure, doctrine, tactics, operating environment, etc.) and their needs is essential. Integrating the user's requirements, logistical requirements, and the acquirer's budgetary and scheduling constraints is a fundamental challenge in DoD acquisition.

Disciplined approach includes five general activities: understanding the requirements, outlining the approach, planning the effort, allocating resources, and executing and tracking the plan. Decisions made using this approach should be re-evaluated as a system matures and circumstances (budgetary, threat, technology) change. A disciplined approach provides a framework for utilizing tools, teams, and processes in a structured manner that is responsive to systematic improvement efforts.

- **Tools** in this IPPD process include documents, information systems, methods, and technologies that can be fit into a generic shared framework that focuses on planning, executing and tracking. Tools help define the product(s) being developed, delivered or acted upon, and relate the elements of work to be accomplished to each other and to the end product. Examples of tools used include integrated master plans, 3-D design tools and their associated databases, cost models linked to process simulations/activity-based costing, development process control methods, and earned value management.

- **Teams** are central to the IPPD process. Teams are made up of everyone who has a stake in the outcome or product of the team, including the customer and suppliers. Collectively, team members should represent the know-how needed and have the ability to control the resources necessary for getting the job done. Teams are organized and behave so as to seek the best value solution to a product acquisition.

- **Development Processes** are those activities which lead to both the end product and its associated processes. To ensure efficient use of resources, it is necessary to understand what activities are necessary and how they affect the product and each other. Examples include requirements analysis, configuration management, and detailed design drawings.

Product and Associated Processes include what is produced and provided to the customer. Customer satisfaction with the product, in terms of mission effectiveness, as well as operating and support aspects and costs, is the ultimate measure of the team's success.

Customer is the user and a team member and also the ultimate authority regarding the product. Any changes to the formal requirements driving the product/process development must come through negotiation with the customer.

This generic IPPD iterative process described above is a systems engineering approach. It differs from the long held view that systems engineering is essentially a partitioning, trade-off, control process that brings the "-ilities" and test functions together. This IPPD process controls the evolution of an integrated and optimally balanced system to satisfy customer needs and to provide data and products required to support acquisition management decisions which, themselves, are part of the IPPD/IPT process. This approach also transforms the stated needs into a balanced set of product and process descriptions. These descriptions are incrementally matured during each acquisition phase and used by DoD and its contractors to plan and implement a solution to the user needs. This process balances cost, system capability, manufacturing processes, test processes, and support processes, as identified in DoD Instruction 5000.2.

The IPPD process is an integrated team effort within DoD and contractor organizations and with each other. DoD crafts the basic acquisition strategy, almost always with industry assistance. Contractors usually play a significant role in development, design, and manufacturing with DoD in a management role. Both participate in each others' major activities through team membership, and the implementation and use of tools and technology.

IPPD Key Tenets

To implement IPPD effectively, it is important to understand the interrelated tenets inherent in IPPD. These key tenets, listed below, were outlined by the Secretary of Defense mandate on IPPD and are consistent with those found in industry:

Customer Focus

The primary objective of IPPD is to identify and satisfy the customer's needs better, faster, and cheaper. The customer's needs should determine the nature of the product and its associated processes.

Concurrent Development of Products and Processes

Processes should be developed concurrently with the products they support. It is critical that the processes used to manage, develop, manufacture, verify, test, deploy, operate, support, train people, and eventually dispose of the product be considered during product design and development. Product and process design and performance should be kept in balance to achieve life-cycle cost and effectiveness objectives. Early integration of design elements can result in lower costs by requiring fewer costly changes late in the development process.

Early and Continuous Life Cycle Planning

Planning for a product and its processes should begin early in the science and technology phase (especially advanced development) and extend throughout every product's life cycle. Early life-cycle planning, which includes customers, functions, and suppliers, lays a solid foundation for the various phases of a product and its processes. Key program activities and events should be defined so that progress toward achievement of cost-effective targets can be tracked, resources can be applied, and the impact of problems**,** resource constraints and requirements changes can be better understood and managed.

Maximize Flexibility for Optimization and Use of Contractor Approaches

Requests for Proposals (RFPs) and contracts should provide maximum flexibility for employment of IPPD principles and use of contractor processes and commercial specifications, standards and practices. They should also accommodate changes in requirements. and incentivize contractors to challenge requirements and offer alternative solutions which provide cost-effective solutions**.**

Encourage Robust Design and Improved Process Capability

The use of advanced design and manufacturing techniques that promote (1) achieving quality through design, products with little sensitivity to variations in the manufacturing process (robust design), (2) a focus on process capability, and (3) continuous process improvement are encouraged. Variability reduction tools such as ultra-low variation process control similar to "Six Sigma" and lean/agile manufacturing concepts should be encouraged.

Event-Driven Scheduling

A scheduling framework should be established which relates program events to their associated accomplishments and accomplishment criteria. An event is considered complete only when the accomplishments associated with that event have reached completion as measured by the accomplishment criteria. This event-driven scheduling reduces risk by ensuring that product and process maturity are incrementally demonstrated prior to beginning follow-on activities.

Multidisciplinary Teamwork

Multidisciplinary teamwork is essential to the integrated and concurrent development of a product and its processes. The right people at the right place at the right time are required to make timely decisions. Team decisions, as a result of risk assessments, should be based on the combined input of the entire team (technical, cost, manufacturing and support functions and organizations) including customers and suppliers. Each team member needs to understand his role and support the roles of the other members, as well as understand the constraints under which team members operate. All must operate so as to seek global optima and targets.

Empowerment

Decision making should be driven to the lowest possible level commensurate with risk. Resources should be allocated to levels consistent with risk assessment authority, responsibility and the ability of people. The team should be given the authority, responsibility, and resources to manage its product and its risk commensurate with the team's capabilities. The authority of team members needs to be defined and understood by the individual team members. The team should accept responsibility and be held accountable for the results of its efforts. Management practices within the teams and their organizations must be team-oriented rather than structurally-, functionally-, or individually-oriented.

Seamless Management Tools

A framework should be established that relates products and processes at all levels to demonstrate dependencies and interrelationships. A management system should be established that relates requirements, planning, resource allocation, execution and program tracking over the product's life cycle. This integrated or dedicated approach helps ensure teams have all available information thereby enhancing team decision making at all levels. Capabilities should be provided to share technical, industrial, and business information throughout the product development and deployment life cycle through the use of acquisition and support shared information systems and software tools (including models) for accessing, exchanging, validating, and viewing information.

Proactive Identification and Management of Risk

Critical cost, schedule and technical parameters related to system characteristics should be identified from risk analyses and user requirements. Technical and business performance measurement plans, with appropriate metrics, should be developed and compared to best-in-class government and industry benchmarks to provide continuing verification of the effectiveness and degree of anticipated and actual achievement of technical and business parameters.

Integrated Product Teams (IPT)

Integrated Product Teams are cross-functional teams that are formed for the specific purpose of delivering a product for an external or internal customer. IPT members should have complementary skills and be committed to a common purpose, performance objectives, and approach for which they hold themselves mutually accountable. IPTs are the means through which IPPD is implemented. Members of an integrated product team represent technical, manufacturing, business, and support functions and organizations which are critical to developing, procuring and supporting the product. Having these functions represented concurrently permits teams to consider more and broader alternatives quickly, and in a broader context, enables faster and better decisions. Once on a team, the role of an IPT member changes from that of a member of a particular functional organization, who focuses on a given discipline, to that of a team member, who focuses on a product and its associated processes. Each individual should offer his/her expertise to the team as well as understand and respect the expertise available from other members of the team. Team members work together to achieve the team's objectives.

Critical to the formation of a successful IPT are:

1. all functional disciplines influencing the product throughout its lifetime should be represented on the team;
2. a clear understanding of the team's goals, responsibilities, and authority should be established among the business unit manager, program and functional managers, as well as the IPT; and
3. identification of resource requirements such as staffing, funding, and facilities.

The above can be defined in a team charter which provides guidance.

Expected Benefits of IPPD

Applying the IPPD management philosophy can result in significant benefits to the customer, DoD, and industry. The primary benefits are reduced cost and schedule while maintaining, often increasing, quality. Essentially, a more balanced tradeoff is achieved among cost, schedule and performance. These gains are realized by the early integration of business, contracting, manufacturing, test, training, and support considerations in the design process, resulting in fewer costly changes made later in the process (e.g., during full rate production or operational test). Figure 1-3 displays anticipated design changes resulting from IPPD implementation versus traditional (serial) acquisition approach, overlaid on a curve of relative cost of making changes. In a traditional approach, the largest number of changes occur late in development, when change costs are high, resulting in higher program costs. In an IPPD process, the bulk of changes occur early in development, when change costs are low, resulting in lower program costs.

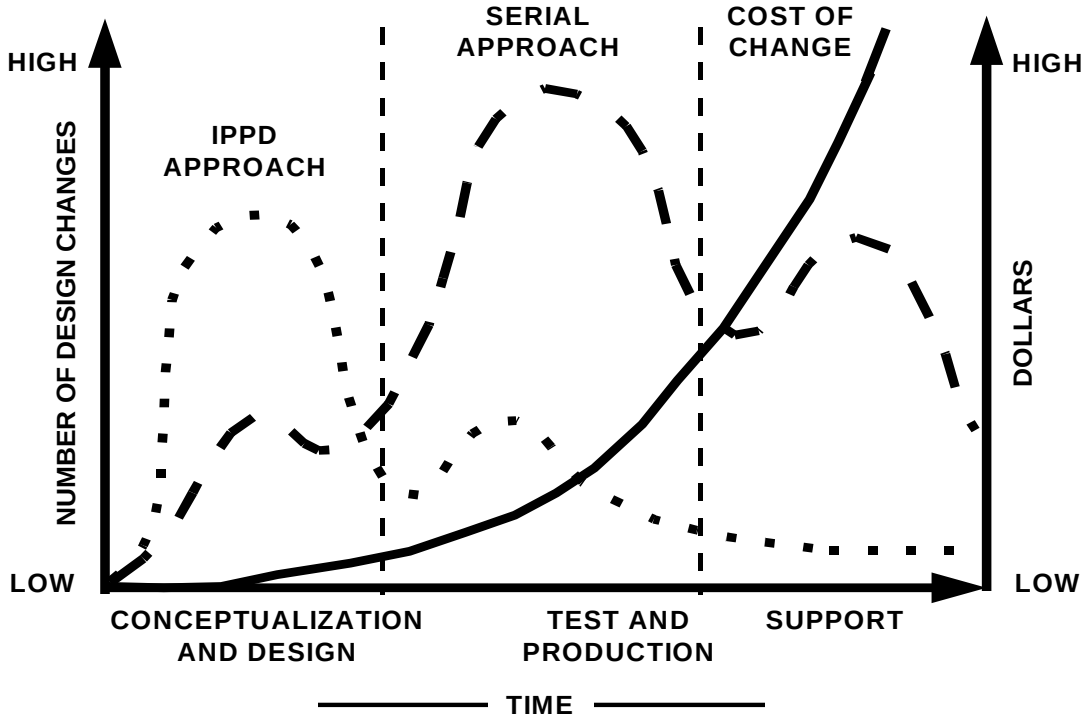

Figure 1-3. Traditional Serial Approach Versus IPPD

The traditional acquisition approach involved each specialist group completing its work in isolation and then passing results on to the next specialist group. This serial approach has resulted in stovepipe competition for organizational rewards. It establishes walls between organizations with resulting inefficiency and ineffectiveness, including a lack of networking and inter-functional communication.

Use of IPPD and IPTs is the antithesis of the traditional approach. The central notion is that product quality and user satisfaction can best be achieved by the integrated concurrent design of the product and its processes.

For example, in IPPD future process requirements are identified and integrated into the evolving product design while still very early in the design phase. However, IPPD does not stop with a one-time identification of process requirements. As product design matures, continued emphasis is placed on the processes, and their attendant costs, required to manufacture, operate, and support the product. This approach greatly reduces the risk associated with design and development. Product and process maturity are achieved earlier, obviating some of the costly late redesign efforts that characterize traditional developments. Moreover, the up-front trade-offs result in more cost-effective designs. Designs can be optimized for cost effectiveness based not exclusively on acquisition cost, but on overall life cycle cost. Such considerations can be critical, since operations and support costs may far exceed acquisition cost.

Successful IPPD implementation can result in:

Reduced overall time to deliver an operational product. Decisions that were formerly made sequentially are now made concurrently and from an integrated perspective. These decisions are based on a life cycle perspective and should minimize the number and magnitude of changes during manufacturing and eventual operational deployment of the product. This in turn reduces late, expensive, test-fix and test-redesign remanufacture cycles that are prime contributors to schedule extensions and overruns.

Reduced system (product) cost. Increased emphasis on IPPD at the beginning of the development process impacts the product/process funding profile (as shown in figure 1-3). Specifically, funding profiles based on historical data may not be appropriate. Some additional funds may be required in the early phases, but the unit costs as well as total life cycle costs should be reduced. This will be primarily due to reduced design or engineering changes, reduced time to deliver the system, and the use of trade-off analyses to define cost-effective solutions.

Reduced risk. Up-front team planning and understanding of technologies and product processes permits better understanding of risk and how it impacts cost, schedule, and performance. This understanding can result in methods or processes for reducing or mitigating assumed risks and establishing realistic cost, performance and schedule objectives.

Improved quality. Teamwork coupled with a desire for continuous improvement results in improved quality of the processes and a quality product for the user.

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Chapter 2 IPPD and DoD Acquisition

"Reengineering our oversight and review process and practices is one of the most difficult issues we will face in acquisition reform. It means we will have to create a climate of reasoned, well-informed risk-management by our PMs and PEOs. Your leadership and good judgement will be critical to successful implementation of this reform. I encourage you and your leadership teams to be active participants in establishing the environment essential for implementing this change."

Paul G. Kaminski, 28 April 1995

Background

The Department of Defense is undergoing a fundamental change in its acquisition of goods and services. Recent acquisition reform actions and new legislation, policies and procedures, along with the IPPD/IPT mandate, will be included in an update/rewrite of the DoD 5000 series of publications. Implementation and management of IPPD and IPTs are addressed in those updates. In addition, a *Defense Acquisition Deskbook* is being developed that will contain information on IPPD management and the roles and responsibilities of IPTs. This guide will be included in the deskbook and updated as necessary to reflect the latest available information to assist in implementation.

OSD IPT Implementation

OSD implementation of IPPD has resulted in a major change in the way OSD maintains oversight and review of major programs. Guidance regarding the formation and use of oversight and review IPTs is contained in the DoD "Rules of the Road - A Guide for Leading Successful Integrated Product Teams" (see shaded area of figure 2-1). Guidance on IPTs for other than OSD oversight programs may be adapted from the "Rules of the Road", this guide, or other government, industry, or commercial publications. Figure 2-1 depicts the types and focus of IPTs covered in "Rules of the Road" and in this guide.

Organization	Teams	Focus	Participant Responsibilities
OSD and Components	**OIPT** *	• **Strategic Guidance** • **Tailoring** • **Program Assessment** • **Resolve Issues Elevated by WIPTs**	• **Program Success** • **Functional Area Leadership** • **Independent Assessment** • **Issue Resolution**
	WIPTs *	• **Planning for Program Success** • **Opportunities for Acquisition Reform (e.g., innovation, streamlining)** • **Identify/Resolve Program Issues** • **Program Status**	• **Functional Knowledge & Experience** • **Empowered Contribution** • **Recommendations for Program Success** • **Communicate Status & Unresolved Issues**
Program Teams & System Contractors	**Program IPTs** **	• **Program Execution** • **Identify & Implement Acquisition Reform**	• **Manage Complete Scope of Program, Resources & Risk** • **Integrate Government & Contractor Efforts for Program Success** • **Report Program Status & Issues**

* See *The Rules of the Road, A Guide for Leading Successful IPTs*

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Figure 2-1. DoD IPT Types, Focus and Responsibilities

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DEFENSE SYSTEMS MANAGEMENT COLLEGE
PROGRAM MANAGEMENT AND LEADERSHIP DEPARTMENT

***Teaching Note* (PM 1)**

Using Teams in the Acquisition Process

John Kelley
February 2000

INTRODUCTION

Many changes have been made, and are being made, in DoD acquisition to acquire products and services to meet the warfighters' needs. One of those changes is the implementation of integrated product teams (IPTs). In May 1995, then Secretary of Defense William Perry issued a memorandum directing the use of IPTs "throughout the acquisition process to the maximum extent practicable." Integrated product teams open the cross-functional and cross-organizational lines of communication, enabling better integration of innovative ideas, improved problem solving and decision making, and effective implementation of decisions and actions in the pursuit of team goals and objectives. The end result can be "better, faster, cheaper" for DoD products -- if the IPTs are properly implemented, staffed and led.

WHY USE TEAMS?

The shift to teams is driven by several factors. Former Secretary Perry recognized that the existing DoD acquisition system would not meet the needs of the customer in the new environment of increased global competition, reduced defense spending while maintaining military technological superiority, and pressures to increase government efficiency. In his paper, "Acquisition Reform: A Mandate for Change," he identified his goals for reengineering the acquisition system. Some of these goals and the processes involved with achieving them can benefit greatly from successfully implementing teams in the acquisition process. They include (Secretary of Defense, pp. 11-13):

- Streamline the acquisition process, focus on continuous process improvement, and ensure that the acquisition process is responsive to customer needs in a timely fashion.

- DoD needs to develop the most efficient, timely, and effective means of acquiring state-of-the-art goods and services to meet its needs at the best value to the government.

- Encourage innovation in products and practices… even if it will result in occasional mistakes.

- Substantially reduce the time it takes to acquire products and services.

- Eliminate functional stovepipes and replace them with integrated decision teams that provide the necessary cross section of functional expertise to address and resolve program issues at the lowest possible management level.

- Empower people by providing appropriate education and training, moving decisions to the lowest level possible, and providing appropriate guidance, not rules.

Another reason for using teams is the rapid growth of worldwide information technology -- no one can handle all the information necessary to manage an acquisition program; all of the people involved must work together to share the information most efficiently and effectively. And, of course, when people learn to work together, the concept of "several heads are better than one" leads to more ideas for solutions to the complex, dynamic problems we face in managing acquisition programs.

WHEN ARE TEAMS APPROPRIATE?

Going back to former Secretary Perry's words, "…to the maximum extent practicable," the intent was to use teams *when and where they were appropriate*. Teams are not appropriate for every situation you will encounter in the acquisition process. Some of you may have had negative experiences with teams already. For example, some organizations read the former secretary's words as "to the maximum extent, period," and have created IPTs for everything down to the office picnic. When are teams appropriate? If the situation calls for some or all of the following, then a team may be the right approach.

- A clear, worthwhile purpose exists.

- Commitment is required from all of the team members to accomplish the shared vision and goals.

- Interdependence is required between team members to accomplish the assigned task(s).

- Flexibility, innovation, and diversity are needed to solve complex, dynamic issues or problems.

- Frequent communications are required between team members, customers, suppliers, and stakeholders.

- The people involved must work through conflict to resolve difficult issues or problems.

- A collective focus is required to accomplish the task/goals.

- Integrated efforts are required between the people and functional areas involved with the task to ensure different perspectives are covered and all requirements are met.

THE BENEFITS OF USING TEAMS

There are many potential benefits to using teams in an acquisition organization. Some of the benefits identified in studies of successful teams are listed below.

- Better Focus on Vision, Goals and Tasks. When team members fully understand the team's purpose, vision, and goals, and are committed to achieving them, they are more likely to remain focused on them.

- Improved Communications. Integrated product teams help to distribute information throughout the organization by increasing the communication between functional areas and between other teams. This improved communication and sharing of information can aid in discovering and resolving problems and issues earlier in the acquisition cycle and help to break down the barriers that normally exist between functional areas/disciplines.

- Synergy. People working together can accomplish more together than they can individually.

- Creativity and Innovation. The diversity of talent, experience, and functional backgrounds enables the team to be more creative and innovative than an individual alone or individuals working separately. As Linus Pauling is reported to have said, "The best way to get a good idea is to have lots of ideas" (Parker, p. 13).

- Improved Problem Solving and Decision Making. Teams can provide improved problem solving and decision making by taking advantage of the different perspectives, experience, and expertise to look at problems and decisions. This can lead to better identification and definition of the problem, more in-depth analysis of causes, generation of more alternative solutions, and making sound decisions.

- Capitalizing on Conflict. Teams that learn to capitalize on their conflict are more likely to make sound decisions because they have thoroughly reviewed the alternative solutions. By getting all of the disagreement out in the open and addressing it, team members are more likely to be committed to implementing the team's decision because their position has been heard and they understand the reasoning behind the decision.

- Professional Development. Teams provide an opportunity for professional development through cross training of the functional representatives. They also benefit from the exchange of ideas, knowledge, and experience, leading to individual, team, and organizational learning.

- Effective Use of Resources. Teams bring together resources from all of the functional areas and the knowledge of how to best use them. Having team members examine issues together is more efficient than passing the issue along sequentially to each individual.

- Better Stakeholder Relationships. Teams provide an opportunity to create better relationships with the stakeholders, as well as customers and suppliers.

But these benefits do not occur automatically simply by creating a team; they do not come easily or quickly. Rather, the people involved (at all levels of the organization) must take specific actions to transform themselves from a collection of individuals into a highly cohesive, effectively performing team.

POTENTIAL DISCUSSION QUESTIONS

1. Why have DoD acquisition programs shifted to using integrated product teams (IPTs) in the acquisition process?

2. Can IPTs contribute to a streamlined acquisition process? If so, how?

3. What trigger questions could you ask to determine if teams were appropriate for your situation?

4. What are the potential benefits of using IPTs in the acquisition process? What are the potential drawbacks?

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DEFENSE SYSTEMS MANAGEMENT COLLEGE
PROGRAM MANAGEMENT AND LEADERSHIP DEPARTMENT

***Teaching Note* (PM 1)**

Building Effective Teams

John Kelley
February 2000

INTRODUCTION

There is no process or checklist to follow that will guarantee successful team performance, but there are general guidelines to follow that are based on teams that were successful and the processes and procedures they used. Like snowflakes, no two teams are alike. Each will be different because they have a different purpose and are comprised of different people who will interact in different ways. Some teams do achieve a high degree of success with seemingly little effort, but they are by far the exception rather than the rule. Teams are not built in a day; they require dedicated efforts on the parts of the leader, all of the team members, higher levels of management and leadership, and the stakeholders.

STAGES OF TEAM DEVELOPMENT

The behaviors you are likely to see during the life of a team can be grouped into distinct stages or phases through which the team will progress. Bruce W. Tuckman first identified these stages. Teams will proceed through the stages at different rates and some will be more adept at capitalizing on them than others. Team leaders need to be aware of the behaviors associated with the stages so they can help guide the team through them.

- Forming. The first phase of development; it begins when the team first comes together. Much in this phase will depend on what experience the members have in working on teams, and if they have worked together before. In many cases, team members will be new to each other, and this phase focuses on such tasks as getting to know each other, defining the roles members will have, describing what expectations they have (for the team, and for each other), and clearly establishing what the team's purpose is. If they are new to each other, they may tend to be polite and obedient.

  During forming, the members may look to the leader, to other team members, or to some existing rules for guidance. The leader should strive to establish trust among team members and develop a sense of teamwork. He or she should help the team develop operating agreements or ground rules to guide how they will interact with one another. The leader should begin assessing the team members to determine their experience levels, capabilities, and willingness to accept responsibility and accountability.

- Storming. This stage can be difficult for team members, but the process is necessary for the team to successfully attain the benefits of teamwork. It is often marked with interpersonal conflict. Ideas may be challenged, closely evaluated, and sometimes "shot down." Members may form alliances, resulting in subgroup competition and conflict, and questions may arise about both the task and process of the team. Team members may revert to what they have done in the past, which is to work on the issues individually; perhaps even openly resist working with other team members. To successfully navigate through this stage, team members must consciously strive to avoid letting this conflict work against them, leading to anger, frustration, or disillusionment, and possibly looking for others on whom to fix the blame.

  Some teams go through this phase fearful that the expression of differences will tear them apart. They may not learn how to adequately deal with differences, and as a result, they may develop a form of passive resistance whereby members simply go along with the leader or a small cadre of members even though they are not really in agreement. This increases the potential for poor decisions, and prevents attaining team unity.

  The team leader should continue to help the team establish and maintain trust, and to emphasize teamwork and team behaviors. He/she should ensure that all team members know what is expected of them individually and as a team. Leaders who use an authoritative leadership style often prevent or hinder the team in learning to address their differences. Instead, the leader may benefit more from being supportive in allowing the team to address and resolve differences. He/she should emphasize that disagreement is natural, and serves as a safeguard against apathy and groupthink. The leader should continue to assess the team members, focusing on what types of conflict resolution they use. If the team has not already participated in team building activities, now may be a good time to do so.

- Norming. Norming is a conscious or unconscious habit that the team develops about the way it conducts business. Examples of unconscious norms include team members sitting in the same seats for each meeting (although seats are unassigned), and the team leader starting (or not starting) meetings on time. Conscious norms are those the team sets for itself, such as in ground rules or operating agreements. Norming usually occurs from the very start, but new norms may be set again after the storming phase. As team members work their way through the conflict, and emerge from the storming phase, they learn from their experience in dealing with each other. The team establishes guidelines for such things as interpersonal communication, resolving conflict, making decisions, completing assignments, and managing meetings. Commitment develops for achieving team goals.

  The team leader may want to revisit the team operating agreements or ground rules, based on what was observed during the storming stage. He or she may also want to revisit the team values and goals to ensure everyone is in agreement with them, and to determine if they were sources of conflict in the group. Now is a good

time to provide increased challenges and responsibilities to keep the momentum going that the team gained by coming through the storming stage.

- Performing. The team capitalizes on their diversity of talent, experience, knowledge and backgrounds to create more alternatives to resolve issues. Team members learn to collaborate by openly communicating and sharing information, and learning how to disagree constructively. Innovative ideas and changes are balanced with effective risk measurement and handling techniques. Team members take advantage of their individual and collective strengths, and work around their weaknesses. Members take initiative and responsibility without waiting for direction from the leader. The team develops the mutual accountability and interdependence that characterize effective teams; they own the goals, tasks, processes, and outcomes.

  The leader can now focus more on where the team is going, how it is getting there, and removing the obstacles in the team's path. The leader can also ensure that his or her boss and appropriate stakeholders are kept informed of the team's progress.

- Adjourning (or Transforming). Most teams are established for a finite time, and once they have achieved their purpose, they are disbanded. Members may return to their organizations or be assigned to another team. It is a time for saying good-bye to fellow team members, but it is also a time for people to reflect on what was good and what lessons were learned.

  It may also be a period of challenge for the team leader and the functional managers as the team members concentrate on looking for their next job. Some may be apprehensive about their follow-on assignments; motivation may drop and loyalty may suffer. The team leader should strive to keep the team focused on the task until the job is complete. This is a time to celebrate the team's success, and to provide recognition and rewards to team members.

Teams may appear to proceed through the stages in the sequence shown above, but team development is influenced by many dynamics and changes to, by, and within the team. In reality, all of the stages are usually present to some extent, but one stage may be more dominant at any particular time. Over the life of a typical DoD IPT, membership changes often; when a new member joins an established team, the forming and storming phases may re-emerge as the dominant stages. The impact will vary depending on the familiarity of the new member with existing team members, his/her knowledge, experience, and expertise, and whether he/she has worked on a team before. The impact can be even greater when the team leadership changes. Other dynamics can impact the team and result in a shift in the dominant stage(s). The team leader and members must continue to apply the principles and success factors they originally developed for themselves, and remain focused on their task and goals.

GETTING THE TEAM STARTED

Teams don't just happen; they must be built. Too often we rush into solving the problem without first addressing exactly what the problem is and what caused it. We tend to have a need for results, usually as quickly as possible. Teams do not benefit from this kind of approach. They are more likely to benefit from setting aside time at the beginning to clearly establish what they are going to do and how they are going to do it. The steps below show an example of a process for getting a team started.

Introductions

Team members should introduce themselves at the first team meeting. Introductions may include such information as functional area of expertise, experience, educational background, and personal interests in the program/project.

Clarify the Team's Purpose

The team's purpose is often misunderstood or misinterpreted. The team leader or chartering authority can provide an initial idea of the team's purpose in an overview briefing, but the team should clearly define the purpose in their own words. This helps to ensure that all team members clearly understand and agree on what they are trying to accomplish while creating a strong sense of ownership of that intent.

Establish Ground Rules

Most effective teams establish operating agreements or ground rules. Ground rules are agreed upon guidelines or norms for individual and team behavior that describe how the team members will interact with one another, what processes they will use, and what they expect of one another. They can be very effective in helping the team through the storming phase, and in managing team conflict to capitalize on the diversity of ideas, experience, and talents, instead of being dragged down by them. They can aid in achieving team goals and objectives, while also making the experience more meaningful and enjoyable. Some areas appropriate for team ground rules include:

- Team meeting attendance and promptness. For example, being present for meetings, being on time, and starting and ending meetings on time.

- How the team will make decisions. Will they use consensus? What if they are unable to reach consensus?

- How they will deal with conflict. For example, having only one speaker at a time, limiting the amount of time one person can speak, striving to collaborate, and seeking win/win solutions.

- The level of team member participation. This is an area that is difficult to enforce. One example is to encourage everyone to participate (rather than saying everyone will participate).

- Team member roles and responsibilities. Examples include whether to rotate team leader responsibilities, team members coming prepared to meetings and completing assigned action items by assigned deadlines.

- Team communications. How the team will communicate (e.g., what is the email policy?), when and how meeting minutes will be distributed.

For ground rules to be effective, they must be enforced. All team members, not only the leader, are responsible for enforcing the ground rules. Ground rules that aren't enforced have no meaning.

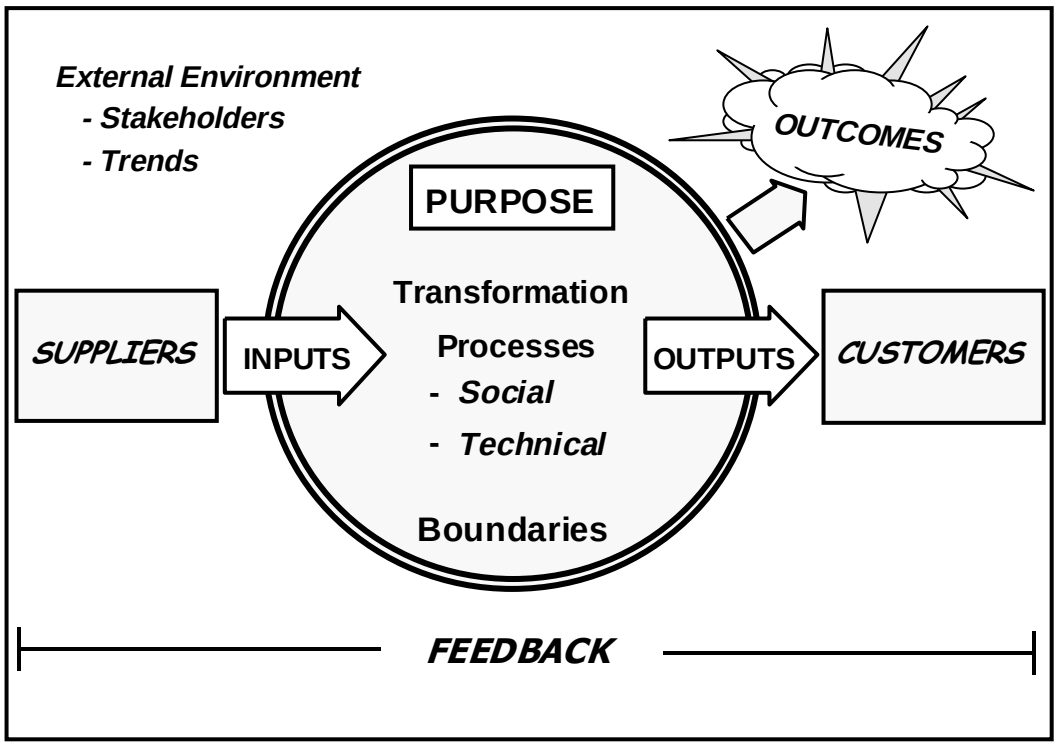
Evaluate the Environment

The team should be aware of and understand the environment in which it operates. The team's actions will often impact other teams and organizations, so it's important to use a systems thinking approach to evaluate the team's environment. To help promote systems thinking, the team could develop a pictorial representation of the environment in which the team operates such as the systems model shown in Figure 1.

Figure 1. Systems Model

Clearly Define the Team's Direction

Once the team clearly defines its purpose, evaluates the environment in which it will operate, and determines its critical success factors, it should more clearly define its direction. This may include identifying the individual, team, and organizational values; agreeing on the team's vision; and setting goals and objectives. Although the initial ideas and guidance may come from the team leader or chartering authority, the team members should create their own final versions. This effort may lead to greater sharing and commitment to the values, vision, and goals.



Draft a Plan of Action

Once the goals and objectives are determined, the team should draft a plan consisting of specific action steps or tasks to guide their achievement. Developing specific action steps can help reduce uncertainty, improve efficiency, improve understanding of the objectives, and provide a basis for monitoring and controlling work tasks. Action plans should include assignment of specific responsibilities, other people who may need to be involved (other teams, contract support, stakeholders, etc.), resources needed (information, funds, materials, training, etc.), target dates, and success criteria (i.e., metrics). In addition to identifying actions that will help achieve goals and objectives, team members may also choose to identify the key barriers to team success, and actions that can help them overcome these obstacles. Documents that might be helpful in preparing action plans include (but are not limited to) the work breakdown structure (WBS), statement of work (SOW), statement of objectives (SOO), specifications, acquisition strategy, and risk management plan.

Determine the Team's Critical Success Factors

Many studies have been conducted on teams who demonstrated effective performance, and the characteristics they exhibited. These characteristics are the attributes and behaviors that can be observed in successful teams, and help reinforce effective performance, but they don't necessarily cause that performance; and in some cases they may even be the result of team performance. Once the team understands and agrees on the goals and objectives, metrics, and the action steps to achieve them, the next step then, is to determine the areas on which to focus to help the team perform effectively. One way is to determine the critical success factors for your team. The critical success factors are things that cause the effective performance.

Since each team is different, the critical success factors that apply for one team in one situation may not apply for your team. The trigger question you need to ask is, "what are the things my (our) team needs to do to succeed?" The answer can help to guide you in determining on what factors you want to focus your development efforts. Some of the more common critical success factors are described below.

- Clear, worthwhile purpose. The team needs to define and understand exactly why it exists and what it is designed to accomplish.

- Direction. Shared values, vision, and goals. Team members should determine what values are shared by all team members, and how well they fit with the organization's values. The vision and goals help to keep the team focused on the tasks when problems and distractions arise.

- Leadership. Team leaders need to assess the capabilities, knowledge, and experience of the team members, and use the appropriate leadership style to guide them toward achieving the shared vision and goals. The team leader often functions more as a facilitator and coach. Leadership roles may be shared at times, with different members acting as leaders based on the issue at hand.

- Open communications. Team members must be willing to openly share information and concerns, and be willing to disagree. They must learn to listen to others to understand their perspectives. The atmosphere should be informal and relaxed, and neither the leader nor any team member should dominate discussions.

- Empowerment. Often misunderstood, empowerment needs to be clearly defined and based on the authority the team members have, the resources available to them, and the level of their knowledge and skills.

- Understanding. Each team member must understand him/herself first, and then develop an understanding of the other team members. People often don't know themselves as well as they think they do, especially when it comes to the perceptions others have of them.

- Team principles. Team members must develop the behaviors and skills necessary to work together and produce effective team performance. Examples include: accepting authority, responsibility and accountability; committing to the team's purpose, vision and goals; setting team ground rules; actively participating; learning to listen to others; being able to deal with conflict; developing a cooperative and collaborative atmosphere; and establishing trust.

- Stakeholder relations. The team should strive to establish a foundation of trust and cooperation with key stakeholders by sharing information on their progress and problems they've encountered. This relationship offers the potential of additional help in overcoming obstacles and meeting the team's goals.

- Resources. Teams need resources to operate and to enhance their productivity, including personnel, funding, and technological resources, such as the means to communicate with one another and others outside the team (other teams, stakeholders, etc.).

- Self-assessment. The team should set aside time to objectively review and evaluate its performance and processes. Members should provide frank feedback to one another. Team members should not make personal attacks; instead their criticism should be constructive and focused on issues, interests, and obstacles to success.

PUTTING IT ALL TOGETHER

Draft a Charter

A charter is an effective means of describing what a team is established to do and how it will proceed. While some general guidance will normally come from levels above the team, the team stands to gain considerably by developing the "meat and potatoes" of the charter. Participating in this process helps team members clearly understand what their purpose is, and what procedures and processes they will use.

As with the purpose and direction, it often translates into increased commitment by all team members because of the ownership they feel for the product. Some teams may choose to finalize their purpose, vision, goals, ground rules, and plan of action as part of putting the charter together. Others may do those activities separately. There is no one right answer for a team charter. Items that may be included are:

- Purpose/direction
- Team goals and objectives
- Metrics
- Schedule
- Team membership
- Authority and boundaries
- Roles and responsibilities
- Organizational fit
- Resources
- Team ground rules
- End products/deliverables
- Decision making procedures
- Customers, suppliers, stakeholders

Conduct Team Training

There are many important team functions that benefit from training (e.g., technical processes, information technology, and product-specific training), but often one of the most overlooked and underrated is training in group dynamics. For a team to attain its greatest effectiveness, the people involved must learn how to maximize their contributions by taking advantage of their differences without being held back by those differences. We often underestimate the difficulty of people working together toward one common purpose, and we do them a great disservice by not offering them training in group dynamics.

Training in group dynamics offers valuable lessons in communicating, learning to listen to others, increasing awareness of team members, building trust among team members, and helping them learn to solve problems together effectively. Studies have shown that most teams who do not invest time in the beginning for team training wish they had later, while those that did were glad they did.

Offsites

Welcomed by some, dreaded by others, the team offsite is one method for building the team in its early stages. The offsite provides an opportunity for team members to get to know one another in an informal setting, to establish the foundation of trust, and provide practice in solving actual work problems, or by solving exercise scenarios and applying that learning toward actual work scenarios.

Some teams may choose to do a significant number of the steps already mentioned as part of the offsite. Others may want to devote the entire offsite to team training activities. New teams should consider dedicating two to four days for their initial offsite, and should conduct shorter follow-up offsites as necessary. Teams should consider using a trained facilitator or training organization to provide the training.

SUMMARY

Teams do provide many benefits, but the concepts and principles must be understood, and they must be correctly implemented. Teams do not succeed merely by being formed; they must be built through dedicated efforts. Building an effective team cannot be boiled down to a five or ten-page document, or a 50-minute lecture. It is a complex challenge that will be different for every team and requires dedicated, conscientious efforts by everyone involved to solve successfully.

Some of you may have been part of effective teams in action. Some of you may have worked on teams with people who were not "team players," where there was little trust and cooperation, or teams that could not or would not make decisions; or that were not truly empowered. The list goes on, but the important point is that whatever your experience with teams may be, we ask you to keep an open mind about teams and consider the material you will be exposed to during ISAC. The power of people working together toward a common goal is impressive; but the power of people working against one another or for their own benefit is equally unimpressive.

POTENTIAL DISCUSSION QUESTIONS

1. What are the five stages of team development? Give a short description of each.

2. What are ground rules (or operating agreements)? Why are they helpful?

3. What are some items that might be included in a team charter?

4. Who should develop the team charter? Who should sign it?

5. Why is team training important?

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DEFENSE SYSTEMS MANAGEMENT COLLEGE
PROGRAM MANAGEMENT AND LEADERSHIP DEPARTMENT

***Teaching Note* (PM 1)**

Program Office Organization
N. A. McDaniel
February 2000

INTRODUCTION

Program Management Office organizing is one of the main functions of management in the defense acquisition process. Other main functions include planning, staffing, controlling and leading. Organizing, in defense systems acquisition involves establishing an organization structure to accomplish the program's goals and objectives. The program's goals and objectives should be based on the mission requirements that are to be satisfied through effective program planning and execution activities. Thus, the organization structure should be driven by, and tailored to meet, the acquisition program's goals and objectives. Another key consideration in organizing for program execution should be how to most effectively and efficiently use the human and other resources available.

ORGANIZATIONAL STRUCTURES

The process of establishing an organization structure for a program office should consist of (1) determining the purpose of the organization, (2) establishing the goals and objectives of the organization, (3) laying out a structure that potentially best supports accomplishment of the program's goals and objectives, (4) implementing the structure, and (5) modifying the structure as necessary.

There are a number of organizational models for organizing a program management office. Some of the models used include functional, product, matrix, and (in recent years) integrated product teams (IPTs). Following is a brief description of each type with its advantages and disadvantages:

Functional Model

A structure in which the main divisions of the organization cover functional areas such as Systems Engineering, Test and Evaluation, Integrated Logistics Support, Planning, Business Management, Comptroller, etc. The functional structured organization is normally staffed with sufficient personnel in each functional division to handle whatever tasks are assigned.

- Advantages: (1) Program Manager has direct control over subordinates; (2) In general, effective communications are easier to maintain; (3) Employee usually has just one boss; (4) PM can respond quickly to surge workloads; and (5) There is depth in expertise.

- Disadvantages: (1) relatively expensive to maintain; (2) Inefficient use of manpower when workload is light; (3) breadth and currency of expertise tends to be limited; and (4) PMO is more vulnerable to duplicating efforts of other PMO's.

Product Model

An organizational arrangement in which a number of similar products are produced and main divisions of the organization are each responsible for one of the products. The overall organization is headed by a Program Manager with subordinate Program Managers heading each main division. These similar products could be ships, aircraft, missiles, vehicles, tanks, etc. These main divisions are functionally organized (system engineering, test and evaluation, integrated logistics support, business management, etc.), and the assigned personnel are expected to handle any workload demands of the program.

- Advantages: (1) PM has direct control over subordinates; (2) Employee usually has just one boss; (3) There is depth and some breadth in expertise; and (4) PM is usually able to respond to a surge in workload.

- Disadvantages: (1) Relatively expensive to maintain (people cost); (2) Tendency toward inefficient use of people; and (3) Currency of expertise tends to suffer due to limited technical exchange opportunities.

Matrix Model

An organizational structure in which the main functional divisions of the organization cover assigned functional areas but the divisions are staffed with a smaller number of full-time employees than the number needed during periods of heavy workload. During periods of heavy workload, additional people are obtained (on an as needed basis) from other organizations. Conceptually, the advantages and disadvantages listed below are valid, but often in practice, the results do not validate the concepts.

- Advantages: (1) More economical to maintain; (2) Has access to greater breadth and depth of technical expertise; and (3) Type of structure generally preferred by higher headquarters.

- Disadvantages: (1) PM does not have permanent control over many subordinates working on the program, (2) Greater challenge for PM to harmonize his/her program priorities and objectives with those of the Functional Support Manager; (3) Greater difficulty in keeping the right people on the project over the long term, and (4) Relatively slow response time in solving problems on fast moving projects.

Integrated Product Teams (IPT) Model

An organizational arrangement based on Integrated Product Development (IPD) and Total Quality Management (TQM) philosophies (ways of thinking), and some features of the matrix organization structure. IPD is a management philosophy that systematically employs a teaming of selected individuals from appropriate functional disciplines to integrate and concurrently apply all necessary processes to effectively and efficiently produce a product or service that satisfies the customer's needs. TQM is a management philosophy that advocates a total system perspective, is customer focused, and process oriented. Using a work breakdown structure (WBS), the system to be acquired is divided into subsystems, and teams (IPTs) are formed for each subsystem with total responsibility for developing/acquiring that product (subsystem). Each IPT consists of a team leader and personnel from each discipline needed to acquire the subsystem. The System Program Director (SPD) manages a Program Integration Team (PIT) consisting of the functional division heads and IPT leaders to ensure overall system integration.

- Advantages: (1) Enhances a customer focus (satisfying the customer); (2) Improves integration of the various technical aspects of the program; (3) Improves communications; (4) Improves teamwork within the IPTs; and (5) Empowers the team members to make decisions within their areas of responsibility commensurate with the degree of risk.

- Disadvantages: (1) Employee usually has more than one boss; (2) Team manning is sometimes insufficient; (3) Lower level coordination among IPTs is more difficult; and (4) Still a lot of unknowns in organizational effects.

Defense contractors choose from the same variety of organizational models discussed above in organizing to meet defense program office requirements. Many defense contractors use a matrix type of organizational structure. However, in recent years, more defense contractors are using some version of an IPT structure. Since profit is a key objective of defense contractors, exploiting the increased decision making and problem solving productivity potential of IPTs is desirable. Also, specific defense contractors tend to mirror government program offices to whom they provide products. They do so to improve communications and increase customer satisfaction.

There is no single type of organizational structure that is appropriate for all situations. Although the matrix is the most prevalent within the Services, the IPT structure is gaining in use. However, as discussed above, each type of structure has its disadvantages. The Program Manager must use his/her best judgment based on the realities of the given situation for selecting an organization model in organizing for effective program execution.

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PM 1
IMPLEMENTING IPPD THROUGH IPTs

FEB 00 PM 1, VG-1

PM 1 Lesson Objectives

Apply IPPD concepts and processes to effectively lead and participate in an IPT

- **Relate key IPPD tenets to program planning and execution**
- **Identify barriers to IPT implementation**
- **Discover the impact of leadership styles on IPT effectiveness**
- **Demonstrate behaviors and characteristics of an effective team**

FEB 00 PM 1, VG-2

Integrated Product and Process Development (IPPD)

A management technique that simultaneously integrates all essential acquisition activities through the use of multidisciplinary teams to optimize the design, manufacturing, and supportability processes.

FEB 00 PM 1, VG-3

Integrated Product and Process Development (IPPD)

IPPD facilitates meeting cost and performance objectives from product concept through production, including field support.

One of the key tenets is multidisciplinary teamwork through IPTs.

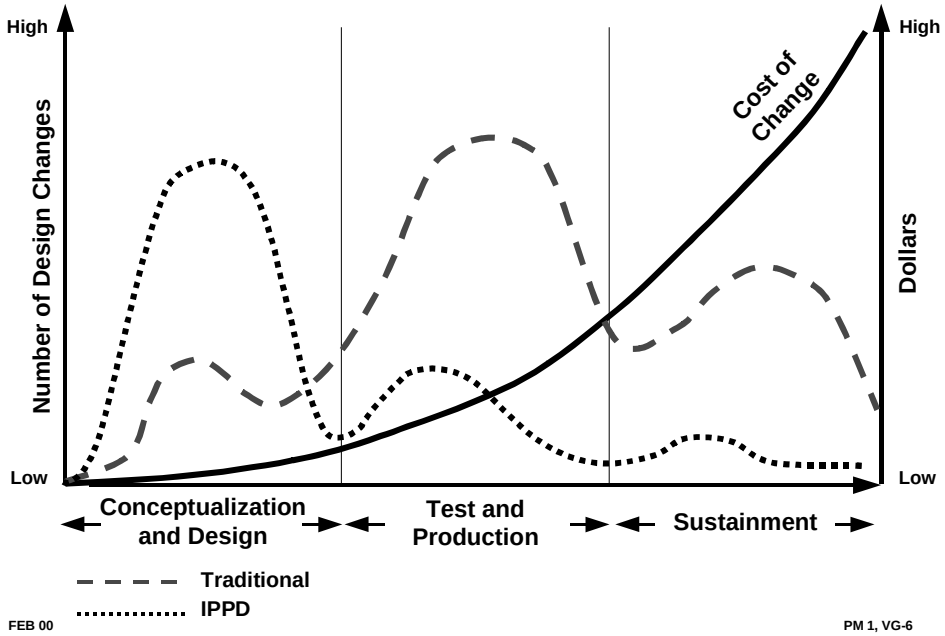
FEB 00 PM 1, VG-4

Why Change?

- **"New" acquisition environment ► *Acquisition Reform***
  - ➨ **Streamline the acquisition process**
  - ➨ **"Better, faster, cheaper"**
  - ➨ **Encourage innovation**
  - ➨ **Integrated teams versus functional stovepipes**
  - ➨ **Making decisions at the lowest level possible**
- **Worldwide growth of information technology**
- **Synergy**

FEB 00 PM 1, VG-5

Traditional vs IPPD Approach



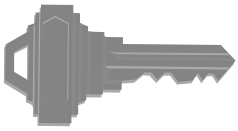
FEB 00 PM 1, VG-6

IPPD Key Tenets

- **Customer Focus**
- **Concurrent Development of Products and Processes**
- **Early and Continuous Life Cycle Planning**
- **Maximize Flexibility for Optimization and Use of Contractor Approaches**
- **Encourage Robust Design and Improved Process Capability**

FEB 00 PM 1, VG-7

IPPD Key Tenets



- **Event-Driven Scheduling**
- **Multidisciplinary Teamwork**
- **Empowerment**
- **Seamless Management Tools**
- **Proactive Identification and Management of Risk**

FEB 00 PM 1, VG-8

Benefits of IPPD

- **Reduced** overall time for product delivery.
- **Reduced** system (product) cost.
- **Reduced** risk.
- **Improved** quality.
- **Improved** response to customer needs.

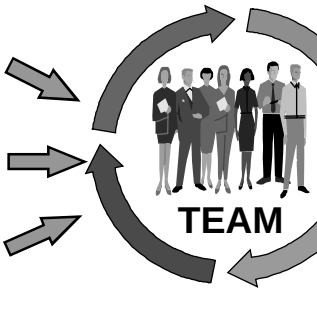
FEB 00 PM 1, VG-9

IPT

FUNCTIONAL REPS

- Program Mgmt
- Engineering
- Manufacturing
- Logistics
- Test & Eval
- Contracting
- User

(All APPROPRIATE Areas)



- ❑ Build successful programs
- ❑ Identify and resolve issues
- ❑ Make sound, timely decisions

FEB 00 PM 1, VG-10

Two Basic Categories of IPTs

Oversight & Review

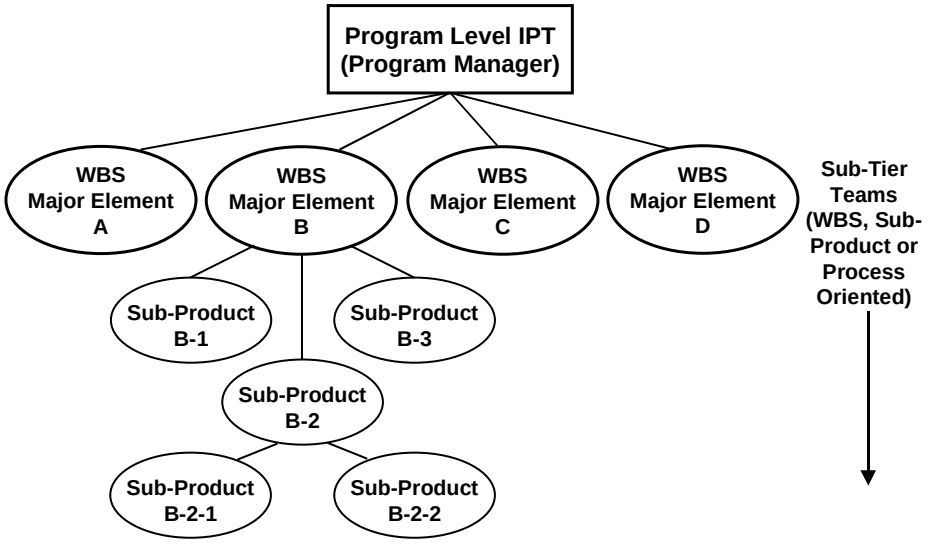
- **Overarching IPT (OIPT)**
- **Working-Level IPT (WIPT)**
- **Integrating IPT (IIPT)**

Execution

- ***Program IPT's***

FEB 00 PM 1, VG-11

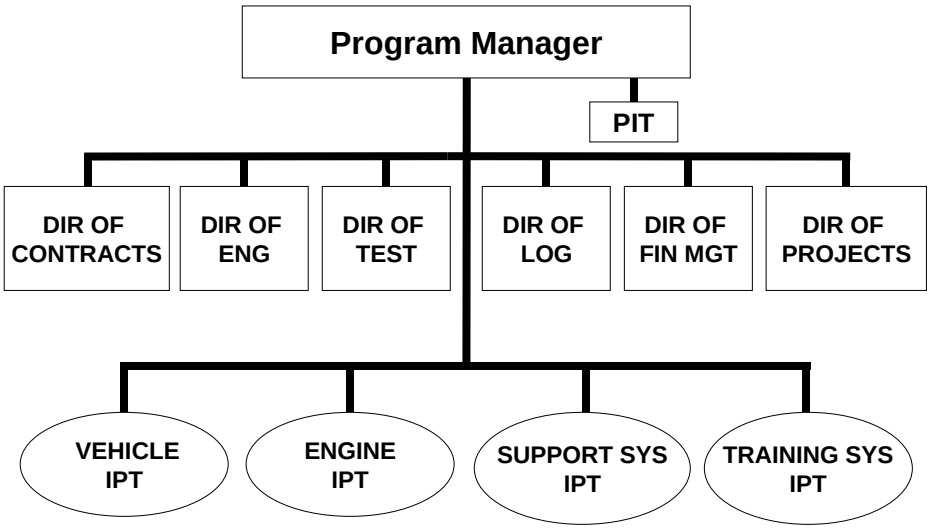
Notional Program Execution IPT Structure



Extracted from: "DoD Guide to IPPD"

FEB 00 PM 1, VG-12

INTEGRATED PRODUCT TEAM STRUCTURE (Example)



FEB 00 PM 1, VG-13

Getting the Team Started

- **Introductions**
- **Clarify the Team's Purpose**
- **Establish Ground Rules**
- **Evaluate the Environment**
- **Clearly Define the Team's Direction**
- **Draft a Plan of Action**
- **Determine the Team's Critical Success Factors**

FEB 00 PM 1, VG-14

Team Success Factors

- **Purpose**
- **Direction**
- **Leadership**
- **Communications**
- **Empowerment**
- **Understanding**
- **Team Principles**
- **Stakeholder Relations**
- **Resources**
- **Self-Assessment**

FEB 00 PM 1, VG-15

Team Charter

- **Purpose**
- **Goals and objectives**
- **Metrics**
- **Schedule**
- **Membership**
- **Authority and boundaries**
- **Roles and responsibilities**
- **Organizational fit**
- **Ground rules**
- **Decision making procedures**
- **End products / deliverables**
- **Customers, suppliers, stakeholders**

FEB 00 PM 1, VG-16

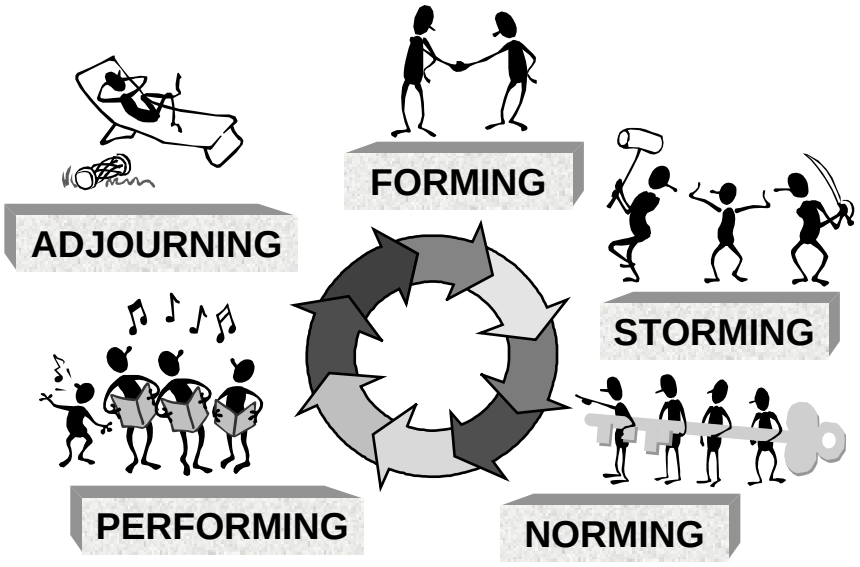
Team Training

Different types:

- **Technical processes (e.g., IPPD)**
- **Information technology**
- **Product-specific**
- **Group dynamics**
  - **Awareness**
  - **Build trust**
  - **Communicating**
  - **Resolving issues**

FEB 00 PM 1, VG-17

Team Development Stages



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Forming

Team members may focus on:

- **Getting to know one another**
- **Defining team member roles**
- **Defining expectations of one another**
- **Identifying tasks and how to accomplish them**
- **Being polite, not wanting to "rock the boat."**
- **Following traditional lines of authority**
- **Asking such questions as "Who's in charge?" and "Why are we here?"**

FEB 00 PM 1, VG-19

Storming

Team members may focus on:

- **Challenging ideas**
- **Forming alliances**
- **Questioning the tasks and processes**
- **Working issues individually instead of as a team**
- **Openly resisting working with other team members**
- **Raising personal issues**

FEB 00 PM 1, VG-20

Norming

Norming can occur from the very beginning, but will likely re-emerge after storming

Team members may focus on:

- **Learning form their experience dealing with one another**
- **Establishing guidelines and boundaries**
- **Developing commitment for team goals**
- **Building trust for one another**
- **Expressing emotions and issues constructively**

FEB 00 PM 1, VG-21

Performing

Team members should be able to:

- **Collaborate through open communications and sharing information**
- **Balance innovative ideas and changes with risk measurement and handling**
- **Take advantage of team strengths and working around weaknesses**
- **Disagree constructively; capitalize on conflict**

Team members develop *ownership* of goals, tasks, processes, and outcomes.

FEB 00 PM 1, VG-22

Adjourning

Team members may:

- **Say good-bye to fellow team members**
- **Reflect on what was good and lessons learned**
- **Have some concerns about "what's next?"**
- **Lose their focus on the final tasks**

FEB 00 PM 1, VG-23

CONSENSUS

A general agreement by *all* team members that they can live with and be *committed* to a particular course of action.

FEB 00 PM 1, VG-24

SYNERGY

When the output of a team is greater than the sum of the contributions of the individual members.

FEB 00 PM 1, VG-25

The Evolution of Leadership

Supervisory Leadership	Participative Leadership	Team Leadership
Direct people	Involve people	*Build trust and inspire teamwork*
Explain decisions	Get input for decisions	*Facilitate & support team decisions*
Train individuals	Develop individual performance	*Expand team capabilities*
Manage one-on-one	Coordinate group effort	*Create a team identity*
Contain conflict	Resolve conflict	*Make the most of team differences*
React to change	Implement change	*Foresee and influence change*

FEB 00 Adapted from Zenger-Miller PM 1, VG-26